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National Highway
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Indiana**

ON-SITE AUTOMATIC SHOULDER BELT INVESTIGATION

**CASE NO. - 94-04
FLEET - PRIVATE VEHICLE
LOCATION -
ACCIDENT DATE - 1990**

Submitted By:

1994

Contract Number: DTNH22-94-A-07048

Prepared for:

**U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590**

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the precrash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

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16. Abstract <p>This report covers an on-site crash investigation involving a 1989 Nissan Sentra that was equipped with an automatic shoulder belt in which the driver was allegedly decapitated by the automatic shoulder belt. The Sentra was entering the left-hand portion of an "S" curve, traveling west-to-southwest, in the westbound lane on a two-lane, undivided, state roadway. The Sentra (case vehicle) came over a hillcrest into the left curve depositing, according to the Police Accident Report, a critical curve scuff prior to losing control. The case vehicle driver who probably did not anticipate the curve and was steering straight as she crested the hill, probably panicked, overcorrecting to the left, crossed the oncoming east-bound lane in a counterclockwise yaw and departed the south edge of the road. The right side tires dug into the dirt causing the vehicle to trip and land initially on the driver's side "A"-pillar and roof siderail. The case vehicle rotated both about its longitudinal and lateral axes--primarily in a side-over-side fashion, rolling approximately three and one-half times and coming to rest on its top heading in an easterly direction. The case vehicle's driver (21 year-old female) was restrained by the available, automatic (passive), motorized, two-point shoulder belt; however, she was not wearing the available, active (manual), two-point, lap belt. According to the coroner, she sustained fatal injuries which included: a complete decapitation of her head at the level of her shoulders and a left femur fracture. It is this contractor's opinion that the decapitation was most likely caused by the driver's (left) automatic (passive) shoulder belt.</p>					
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TRC/IU ON-SITE AUTOMATIC SHOULDER BELT INVESTIGATION

TRC/IU CASE NO. 94-04

FLEET - PRIVATE VEHICLE
LOCATION -Summary

This report concerns a motor vehicle crash involving 1989 Nissan Sentra that was equipped with an automatic shoulder belt in which the driver was allegedly decapitated by the automatic shoulder belt. The crash occurred on 1990 at 7:00 p.m., near on a State road.

The Sentra was entering the left-hand portion of an "S" curve, traveling west-to-southwest, in the westbound lane on a two-lane, undivided, state roadway. The Sentra (case vehicle) came over a hillcrest into the left curve depositing, according to the Police Accident Report, a critical curve scuff prior to losing control. The case vehicle driver who probably did not anticipate the curve and was steering straight as she crested the hill, probably panicked, overcorrecting to the left, crossed the oncoming eastbound lane in a counterclockwise yaw and departed the south edge of the road. The right side tires dug into the dirt causing the vehicle to trip and land initially on the driver's side "A"-pillar and roof siderail. The case vehicle rotated both about its longitudinal and lateral axes--primarily in a side-over-side fashion, rolling approximately three and one-half times and coming to rest on its top heading in an easterly direction.

The Sentra most likely rolled over three and one-half times and, in the process, impacted its front, left, right, and top surfaces with the greatest deformation occurring through the top left surface. The CDC was determined to be: 00-TDDO-4 for the rollover. The CRASHPC reconstruction program could not be used on the case vehicle's rollover impact because of the collision conditions.

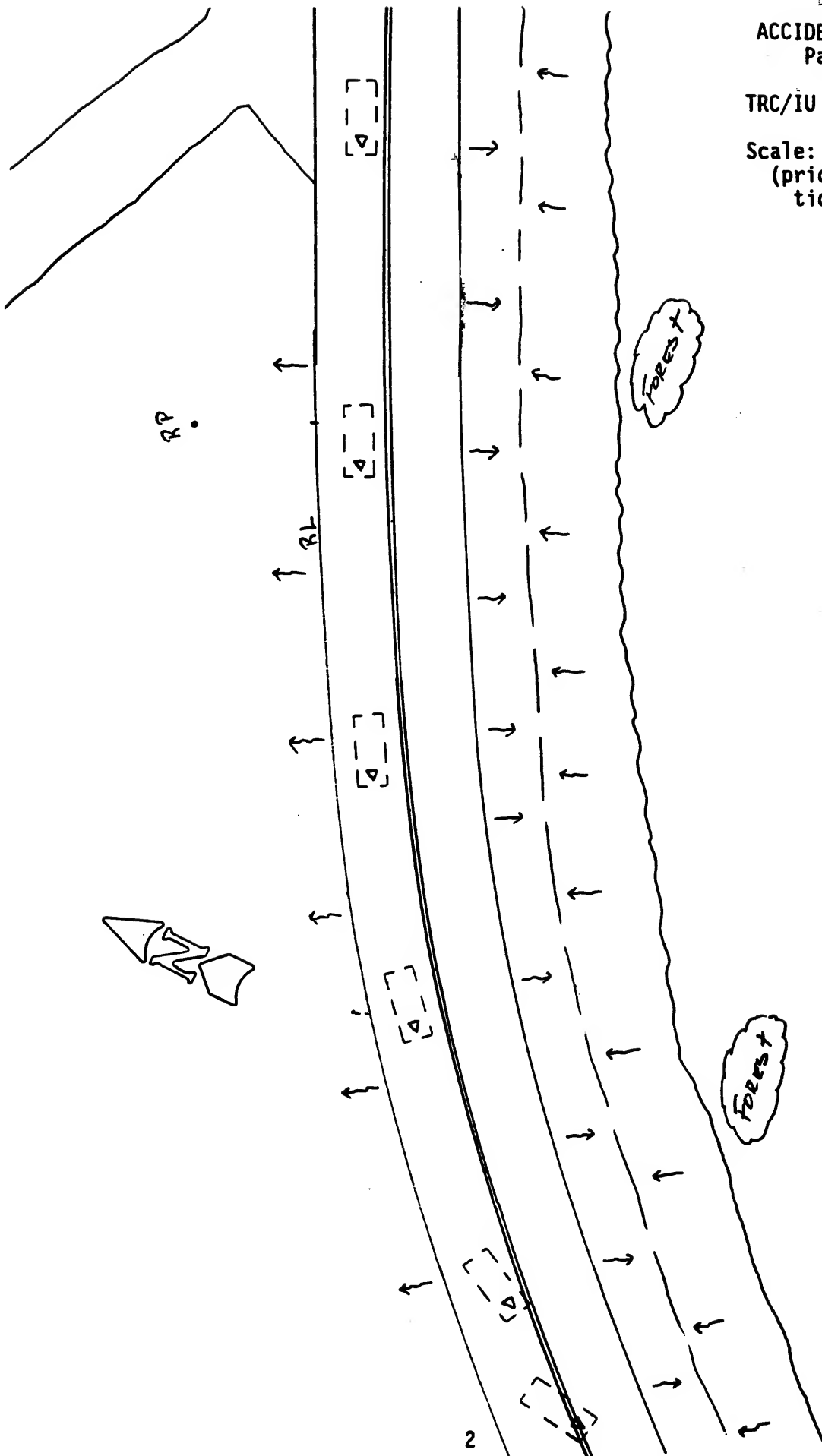
The 1989 Nissan Sentra was equipped with a active (manual), two-point, lap belt and an automatic (passive), motorized, two-point shoulder belt. The driver of the case vehicle (21 year-old female) was restrained by the available, automatic, motorized, two-point shoulder belt; however, she was not wearing the available, active, two-point, lap belt. According to the coroner, she sustained fatal injuries which included: a complete decapitation of her head at the level of her shoulders and a left femur fracture. The driver of the Sentra was listed on the Police Accident Report as sustaining a "K" (fatal) injury as a result of this crash. It is this contractor's opinion that the decapitation was most likely caused by the driver's (left) automatic (passive) shoulder belt.

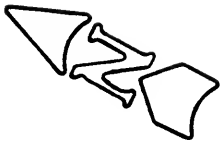
ACCIDENT SCHEMATIC

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Scale: 1 cm = 2.5 m
(prior to reduction @ 90%)

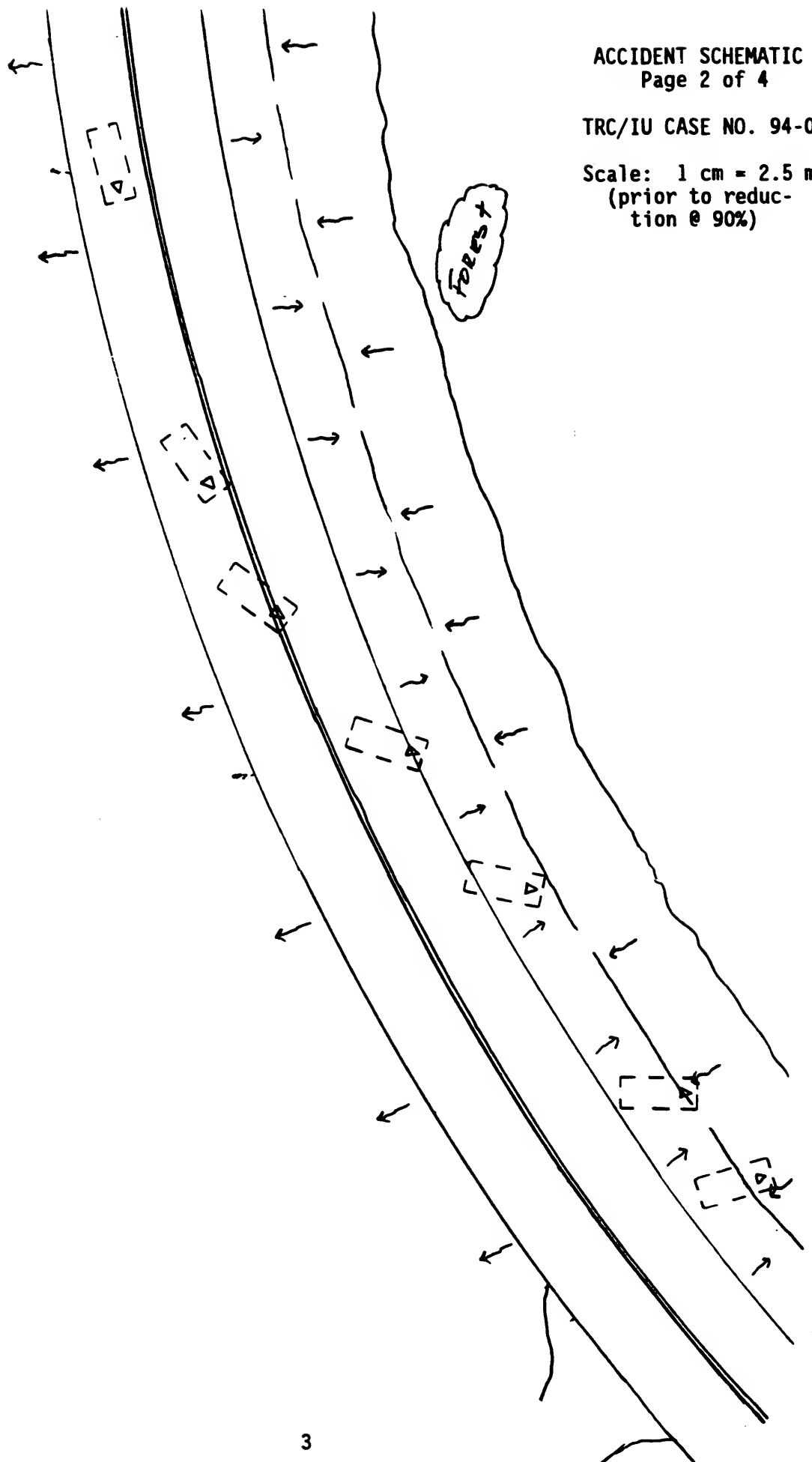




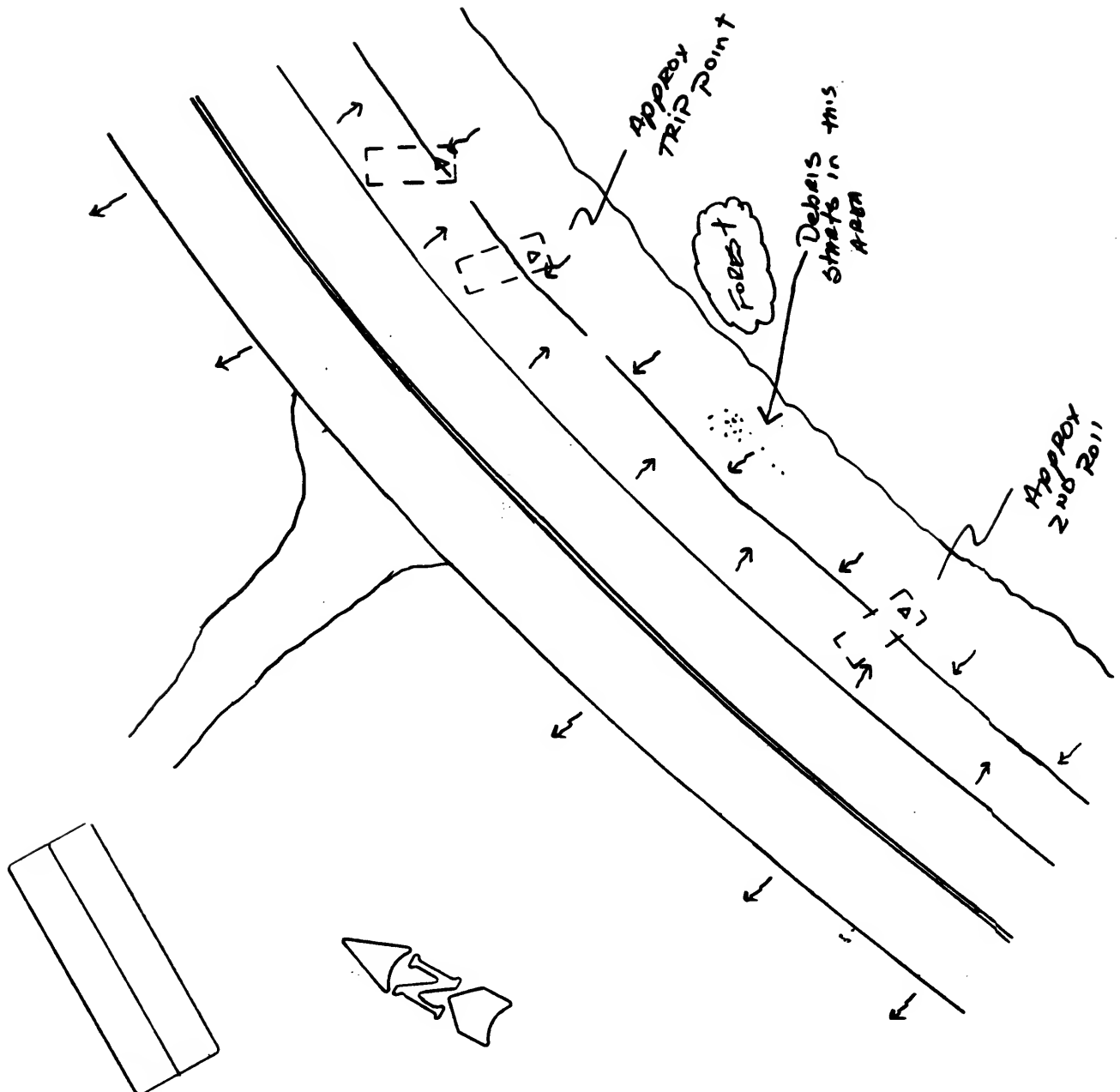
ACCIDENT SCHEMATIC
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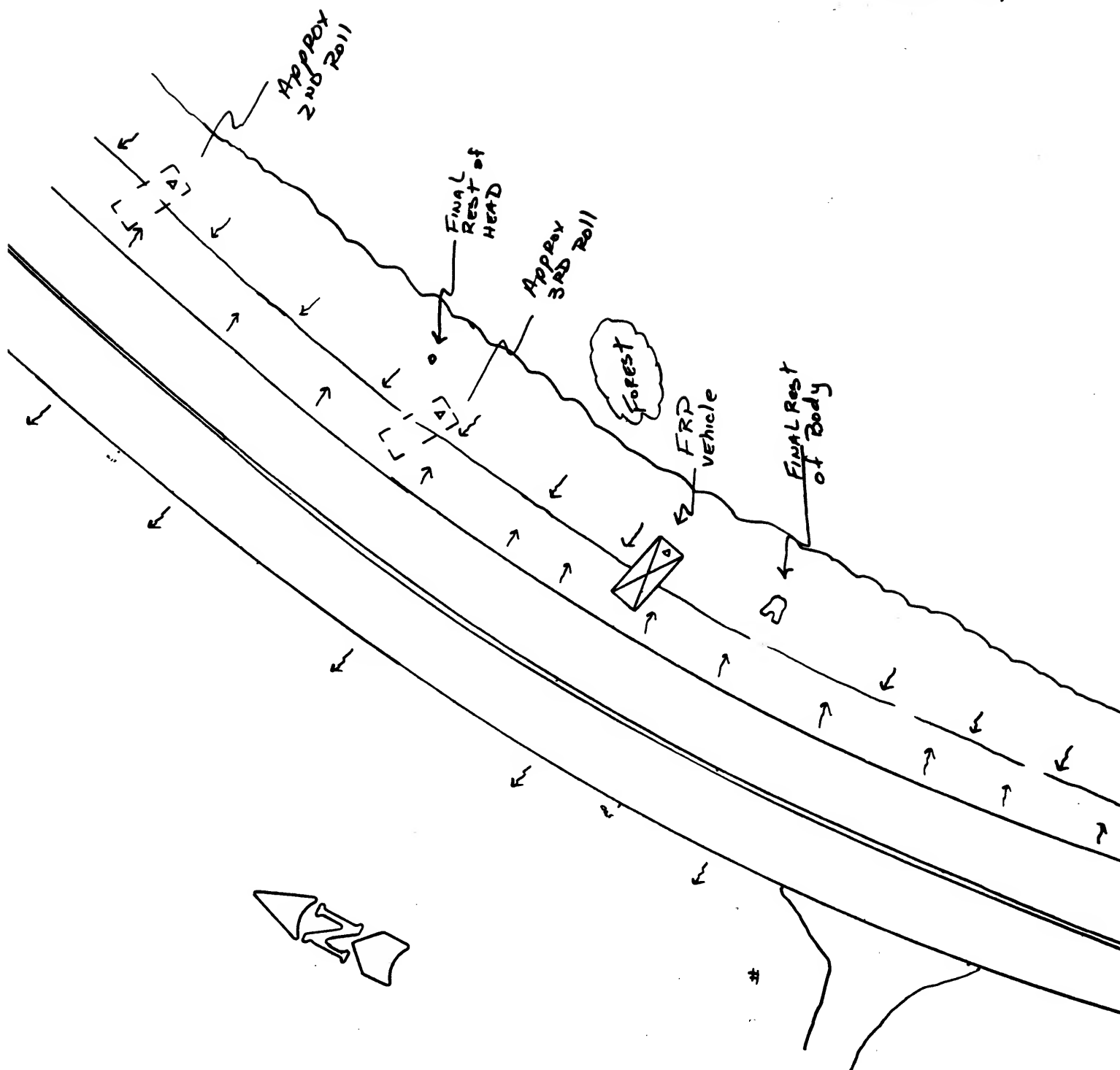
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TRC/IU ON-SITE AIR BAG INVESTIGATION

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TRC/IU CASE NO. 94-04

FLEET - PRIVATE VEHICLE
LOCATION

ACCIDENT DATA

Location/Street: State Road
City/Township: County, near
Area/Type: Rural
Accident Date/Time: 1990 @ 7:00 p.m.
Investigating Police Agency: State Police
Accident Type: Car - ran-off-road
Occupant Injury Severity
(automatic restraint vehicle): Decapitation (AIS-6)

AMBIENT CONDITIONS

Light conditions: Dark, no highway lighting
Weather Condition: Clear
Precipitation: None
Road Surface: Dry

ROADWAY

Case Vehicle

Location: State road
Number of Travel Lanes: 2-lanes, undivided
Width: 3.7 meters (12.0 feet*)

* {NOTE: This measurement was made by this contractor in of 1994; it is unknown why the measurements made by the investigating police agency [see Police Accident Report--2.75 meters (9 feet)] and by the police officers hired by the plaintiff [2.75 meters (9 feet)--see Plaintiff's Court Documents Etc., page 13)] differ so radically; unless, road improvements have been made in the four years since the crash.}

Surface Type: Asphalt
Median: None

ROADWAY (CONT'D.)**Case Vehicle**

Shoulders: unimproved with an average of 7.5 centimeter (3 inch) dropoff

Vertical alignment: 2.0 percent negative to west-southwest

Horizontal alignment: Curve left with 10 % positive superelevation

Estimated Coefficient of Friction: .60 {average, includes grass}

Traffic Density: Light

TRAFFIC CONTROLS**Case Vehicle**

Signals: None

Signs: "S"-Curve warning sign prior to hillcrest

Markings: Solid double yellow center line

Speed Limit: 89 k.p.h. (55 m.p.h.)

VEHICLES**Case Vehicle**

Year: 1989

Make: Nissan

Model: Sentra

Body Type: Two-door hatchback

V.I.N.: JN1GB24P8KU----- See page 48

Steering: Power-assisted, rack-and-pinion

Brakes: Power-assisted, 4-wheel disc

Padding: Roof, door panels, steering wheel and dashboard

Active Restraints: 2-point lap belts front and rear

Passive Restraints: 2-point, motorized, shoulder belts at front out-board seating positions

Defects: Unknown

VEHICLES (CONT'D.)

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Case Vehicle

Fleet: Private vehicle
Tow status: Towed due to damage

VEHICLE DAMAGE**Exterior****Case Vehicle**

Event number: One
Object Struck: Ground
Damage location
 Damaged Plane: Top
 Vertical Location
 On Plane: Distributed
 Length Direct: Distributed
 Direct Begins: Not applicable
 Field L: Not applicable
 C₁: Not applicable
 C₂: Not applicable
 C₃: Not applicable
 C₄: Not applicable
 C₅: Not applicable
 C₆: Not applicable
 D: Not applicable
 Maximum Crush: 21 centimeters (8.3 inches)
 Location: Top
CDC: 00-TDDO-4
Damaged Components: Hood, roof, bumper, grille, right and left fenders, "A"- and "B"-pillars

Interior

Damaged Components: Driver door panel, all windows
Other Evidence of Occupant Contact: Rounded indentation to left side edge of sun-roof, indentation to driver door panel
Manual Restraint System Failures: None used
Seat Performance Failures: None

VEHICLE DAMAGE (CONT'D.)

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Case Vehicle**Repair**

Cost Estimate: Unknown (total loss), car impounded then sold to towyard

VEHICLE VELOCITY ESTIMATES**Highest Delta "V"****Case Vehicle**

Reconstruction Program: None

Program Algorithm: Not applicable

Travel Speed: Range: 97.4-99.0 to 116.8-121.8 k.p.h. (60.5-61.5 to 72.6-75.7 m.p.h.) based on defendant's estimate--see Plaintiff's Court Documents Etc., page 22R and Testimony ... of Defendant's Expert Witnesses, page 30 and 30R
Range: 71.4 to 92.3 k.p.h (44.36 - 57.33 m.p.h.) based on reconstruction performed by two police officers hired for the plaintiff in the subsequent lawsuit--see Plaintiff's Court Documents Etc., pages 15 and 39)

Total Delta "V": Not applicable

Longitudinal Delta "V": Not applicable

Lateral Delta "V": Not applicable

COLLISION SEQUENCE

Pre-Crash: The case vehicle (Sentra) was entering the left-hand portion of an "S" curve, traveling west-to-southwest, in the westbound lane on a two-lane, undivided, state roadway and was attempting to continue in its direction of travel. The case vehicle came over a hillcrest into the left curve depositing, according to the Police Accident Report, a critical curve scuff prior to losing control. *NOTE: Both the investigating police officer and the officers hired by the plaintiff made reference to a critical curve scuff (see Plaintiff's Court Documents Etc., pages 13-15 and 39).* The case vehicle driver who probably did not anticipate the curve and was steering straight as she crested the hill, probably panicked, overcorrecting to the left, crossed the oncoming eastbound lane in a counterclockwise yaw and departed the south edge of the road sliding onto the unimproved shoulder and into a drainage ditch. The shoulder and ditch consisted of red earth and grass and several rocky bare spots; see rim gouges on Selected Print # 30--page 29. The case vehicle's right side tires (see Plaintiff's Court Documents Etc., page 30R) dug into the soil causing a plowing effect and tripping the vehicle. The

COLLISION SEQUENCE (CONT'D.)

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Pre-Crash: (Cont'd.)

case vehicle appears to have rotated approximately 75 degrees counterclockwise from its {original westward} path of travel just prior to rollover initiation.

Crash:

After tripping the case vehicle landed initially on the driver's side "A"-pillar and roof siderail. The case vehicle rotated both about its longitudinal and lateral axes--primarily in a side-over-side fashion, rolling approximately three and one-half times, rotating counterclockwise, and coming to rest on its top heading in an easterly direction. According to two police officers who were hired by the plaintiff (see Plaintiff's Court Documents Etc., page 13 and 39) and who were able to survey and measure the scene a short time after the crash, the case vehicle rolled one and one-half times. Given the various speed estimates (see Plaintiff's Court Documents Etc., pages 15, 22R, and 39) and the distance between case vehicle's trip and final rest being approximately 51.8 meters (170 feet), this contractor believes that the case vehicle rolled three and one-half times. Due to the contour of the ditch, the case vehicle's rollover generally followed the ditch in a southwesterly direction.

Post-Crash:

Occupants: The case vehicle was equipped with a active (manual), two-point, lap belt and an automatic (passive), motorized, two-point shoulder belt. The driver of the case vehicle was restrained by the available, automatic, motorized, two-point shoulder belt; however, she was not wearing the available, active, two-point, lap belt. The driver of the case vehicle was ejected through the left front (driver's side) window during the case vehicle's second full roll. The driver sustained a complete decapitation of her head at the level of her shoulders. It is this contractor's opinion that the decapitation was most likely caused by the driver's (left) automatic (passive) shoulder belt. The driver's head was found 13.8 meters (45.5 feet) northeast of the case vehicle's final rest, and the torso was found 6.3 meters (20.6 feet) southwest. She was killed almost instantaneously.

Police: The investigating police agency was notified of the accident within approximately fourteen minutes and arrived on-scene within approximately thirty minutes. The investigating police officer did not take any scene photographs nor was any scene measurements taken. Traffic control procedures were established and emergency medical, volunteer fire, and towing services were called to assist.

Rescue: The case vehicle driver was pronounced dead at the scene by county coroner approximately seventy minutes after the crash and was transported by ambulance to a medical facility where blood and urine samples were taken. No autopsy was performed on the driver; instead, a noninvasive exam and a toxicological analysis were performed.

Removal: Following the police investigation, the case vehicle was towed from the scene.

HUMAN FACTORS/OCCUPANT DATA

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Case Vehicle

Driver: 21 year-old female
Height: Unknown
Weight: Unknown
Occupation: Seamstress
Active Restraint System/Usage: 2-point lap belt/not used
Usage Source: Plaintiff's Court Documents Etc., pages 3, 5, 35, and 35R
Eye glasses/contacts: Unknown
Vehicle Familiarity: Unknown: owner, sole driver
Route Familiarity: Unknown: see Trip Plan below!
Trip Plan: Following boyfriend to residence
Manner of Leaving Scene: Ambulance
Type of Medical Treatment: None, dead at scene

DRIVER INJURIES

<u>Injury</u>	<u>Severity (AIS)</u>	<u>Source</u>
Decapitation	311000.6,0	Driver's two-point, automatic (passive), shoulder belt (probable)
Fracture, left femur	851800.3,2	Left window sill (possible)

DRIVER KINEMATICS

The initial posture of the driver just prior to cresting the hill, during the control loss, and just prior to tripping is unknown. What actions the driver took are also unknown; although, the presence of a critical curve scuff indicates that the driver initiated a leftward steering input. Once the case vehicle began sliding sideways onto the south shoulder and the right side tires began digging into the ground and the vehicle began to trip, it is most likely that the driver, who had no lap belt on and no torso resistance from the driver's two-point, automatic (passive), shoulder belt--because the driver's right shoulder is uninhibited, was propelled toward the right interior side surface of her vehicle.

DRIVER KINEMATICS (CONT'D.)

BEST AVAILABLE

The physical evidence on the case vehicle indicates that the most significant crush during the rollovers occurred to the left "A"-pillar, roof, and roof siderail. This supports the notion that during the first, and highest energy roll, the vehicle rolled towards its right and came down upside down on the left "front fender"/hood/"A"-pillar/roof. The driver was most likely compressed against the case vehicle's interior right side and right roof siderail area. As the vehicle becomes airborne, up-side-down, the driver most likely remains compressed against the right interior until the left roof area impacts the ground.

When the initial left roof area impact occurred, the case vehicle experiences a deceleration which together with the continued rotation about the longitudinal axis causes the driver to be propelled across the roof area from right to left. Because the case vehicle was rotating counterclockwise when it tripped and began to roll, the vehicle also experiences some rotation about its lateral axis. This lateral rotation plus the inherent engine weight is what causes the hood/"left front fender" area to come down first instead of the hatchback area. This phenomena produces some longitudinal deceleration which causes the two-point, automatic (passive), shoulder belt to lock-up in anticipation of loading.

This contractor believes that as the driver was propelled across the roof, her neck most likely struck and slid along the loaded automatic shoulder belt causing the belt to decapitate the driver; see Plaintiff's Court Documents Etc., pages 44 to 55 (specifically pages 49 to 52R), for a discussion regarding the ability of a torso belt to cut through a human neck. As the case vehicle continued to roll about its longitudinally axis, this contractor believes that first, the driver's head, and subsequently, the driver's torso, were ejected out the driver's glazing area as the vehicle began its second full roll; see Plaintiff's Court Documents Etc., pages 69 to 71 (specifically page 71R), for a discussion about the ejection. NOTE: The driver's glazing was almost certainly shattered during the initial impact.

The indentation in the driver's door most likely occurred when the driver loaded the door as she was propelled across the roof from right to left. This contractor further believes that the driver most likely sustained her femur fracture when she loaded the driver's door just prior to the ejection of her torso.

DISCUSSION:

The following is an excerpt from the testimony given in United States District Court by the forensic pathologist who testified on behalf of the Plaintiff in the subsequent civil case--specifically see Plaintiff's Court Documents Etc., pages 49 to 52R (pages 555 to 562). The testimony given provides a powerful description of the most plausible explanation of exactly how the decapitation could have occurred.

"... In the types of cases where a flatbed truck or the edge of a truck like that causes a decapitation or partial decapitation, it's never clean because you've got some thing that's about an inch or two inches wide that comes in and there's a great amount of force, and there's usually a lot of fractures of bones and a lot of trauma to the tissues around it, even though you can get a

DISCUSSION: (CONT'D.)

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decapitation or partial decapitation. To decapitate someone, the neck, which is, depending on the person, anywhere from four inches to six inches in diameter, has to be able to go all the way from one side of it to the other. Or the body has to slide across that object from one side to the other. So there can't be an object that would stop whatever is cutting through the neck from going all the way through it... So I had evidence in my case that led me to believe that there was no other reasonable conclusion except that this belt had decapitated her. Well, everybody said, well, how can a nylon belt that's soft cut through somebody's neck and cut through bone? Well, nylon is as strong as steel if you -- if you anchor it at two points, you virtually can't break it... So they're strong. They're strong enough to do it. All it requires is the proper circumstances where the body gets against it in a certain way that it can get through the skin, which is the greatest barrier to it initially, and then pass through the tissues. You might compare it to say, well, how can a piece of paper cut you? And you've all probably had paper cuts from the edge of a piece of paper. Circumstances have to be right to cut your finger with that edge of the paper. Or when you're a kid and you're trying to make a whistle with a blade of grass, and you've got a blade of grass and you can cut your finger with a blade of grass. So it's common circumstances in ordinary life tell us that things that ordinarily can't cut in certain cases can cut and do that... Her face was described as free of any injuries, even abrasions that it almost looked like you could put make up on her and she would be all right... She had no fractured nose, no fractured face, no fractured jaw... But the people that observed her didn't observe any disfigurement of her face, any asymmetry of her chest, and this tell us something, too, because it tells us she didn't hit anything inside the vehicle or outside the vehicle hard enough to at least disfigure her face and disfigure her body... I looked at the sun roof because I at one time thought the sun roof, not by the glass, but by the edges of it. I have some pictures of the sun roof (see TRC selected prints # 40 to # 42--pages 34 and 35) that show that it's a -- has a rolled lip around the edge. ... and you can see the sun roof obviously has a lip where the glass sets in it that's recessed so that it's smooth across the top... If it was possible that she somehow hit against this, and accident people say loading, it means you hit up against something, it is possible for it to cut into her neck, but probably, because it is so wide, I mean, it's that depth about from the bottom of it to the top, we probably would get some significant bruising and some significant injury around the skin, even though it might be capable of cutting through the skin... Could it decapitate someone? But could it create the same type of injuries you see? And would the rest of what happened be consistent with that decapitating someone? If the belt decapitates someone, as she's thrown out the driver's window or out the sun roof, the shoulder strap comes across her neck like this, as she's going out the window, her head can -- this belt can go right through her neck, her head can go out, as the car continues to roll on over, her body has already started out the window, and it can go over in this direction over here... And in every case there are two factors that are always constant. One, the person must be ejected. The reason you have to be ejected is because you have to somehow load on the belt. The second factor in almost every case was that there was only a shoulder strap, no lap belt and no other restraint system involved."

The defendant's {alternative} explanation of how the decapitation occurred is presented in Testimony ... of Defendant's Expert Witnesses, pages 115 through 117 {pages 1040 to 1044}.

SELECTED PRINTS



01 -- 1989 Nissan Sentra SE's path of travel (westward) approaching S-curve ~ 200 meters east of curve; NOTE: Curve warning sign



02 -- Sentra's westward travel toward hillcrest approaching S-curve approximately 50 meters east of curve's beginning



03 -- Sentra's westward travel near hillcrest approaching S-curve approximately 25 meters east of curve; NOTE: left-hand downgrade



04 -- Approximate area where Sentra goes into CCW yaw after cresting hill and entering left-hand, downgraded curve



05 -- Approximate area where Sentra departs south side of roadway in CCW yaw



06 -- Sentra's southwest path of travel on south roadside just prior to rollover initiation; NOTE: red FRP flags in cells D4 & E4



07 -- Sentra's southwestward rollover path along south roadside; NOTE: red FRP flags in cells D4 (driver's head) and E4 (Sentra)



08 -- Continuation of rollover path along south roadside; NOTE: red FRP flags in cell E4 mark driver's head, Sentra, and body



09 -- Rollover continues; red flags mark FRP of driver's head (cell B5), Sentra (cell F4), and driver's body (cell E4)



10 -- Red flags mark final rest position of Sentra (cell F5) and driver's body (cell E2)



11 -- Looking back at path of travel from Sentra's FRP (cells E6 and F6); NOTE: red flag in cell F4 marks FRP of driver's head



12 -- Looking back at path of travel from approximate location of driver's head



13 -- Looking back at path of travel from approximate location where Sentra departed south roadside



14 -- Looking back at Sentra's path of travel from west side of hill-crest; NOTE: spurious tire marks in cells C5--D8 and E4 & E5



15 -- Looking back at Sentra's path of travel from east side of hill-crest prior to entering left-hand, downgraded S-curve



16 -- Frontal view of Sentra--offset slightly leftward; NOTE: initial impact was to driver's side top, and bumper has been torn off



17 -- Close-up frontal view of Sentra--offset slightly leftward; NOTE: crush is downward at L A-pillar & rearward at L front fender



18 -- Left front view of Sentra showing lateral striations and left roof crush



19 -- Close-up of lateral striations to left front fender and hood from rocky soil



20 -- Left top view of Sentra's left side showing striations and crush to left A-pillar and roof



21 -- Close-up of roof striations (heavy on left side) and crush (sun-roof, windshield header, and buckled A-pillar)



22 -- Close-up of left center and rear showing shattered backlight and downward crush to left roof siderail



23 -- Rear-left-top perspective of Sentra showing shattered backlight and crush to left and rear



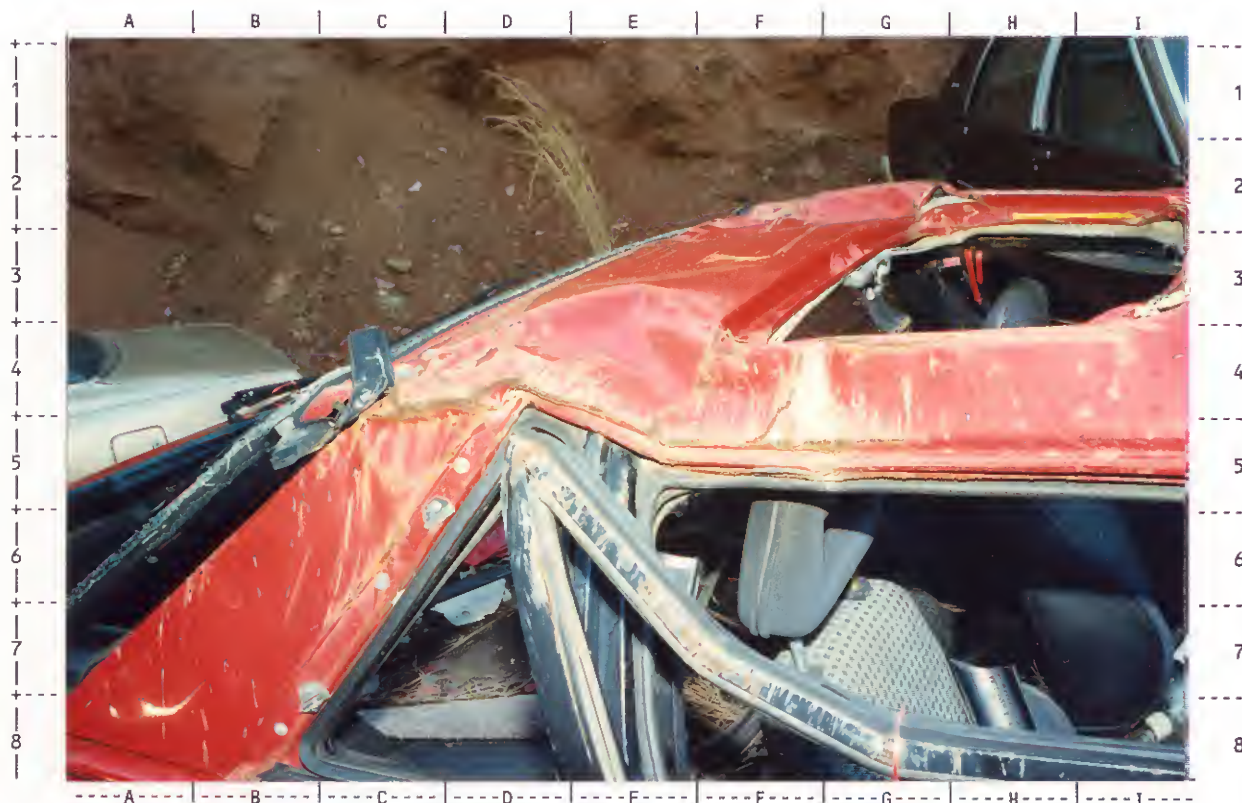
24 -- Rear view of Sentra--offset slightly rightward, showing that L side had the greater downward crush; NOTE: L taillights & trunk



25 -- Rear-top perspective of crush to Sentra's roof and hood taken from standing on top of rear bumper



26 -- Rear-right view of crush to Sentra's right side; NOTE: antenna and right roof siderail



27 -- Close-up of striations & crush to right side B- & C-pillars & R door frame; NOTE: yellow incremented tape in cells H2 & I2



28 -- Right-front view of Sentra's crush; NOTE: rightward hood shift



29 -- Close-up of Sentra's right front wheel/tire and fender; NOTE: tire is flat & dirt is caked into wheel rim (see cells D7 & E7)



30 -- Closer-up of Sentra's right front wheel rim showing gouges in wheel rim (see cells C4 & D3--F3)



31 -- Front-right-front perspective of Sentra's frontal crush & crush to right front fender; NOTE: flat right front tire and rim



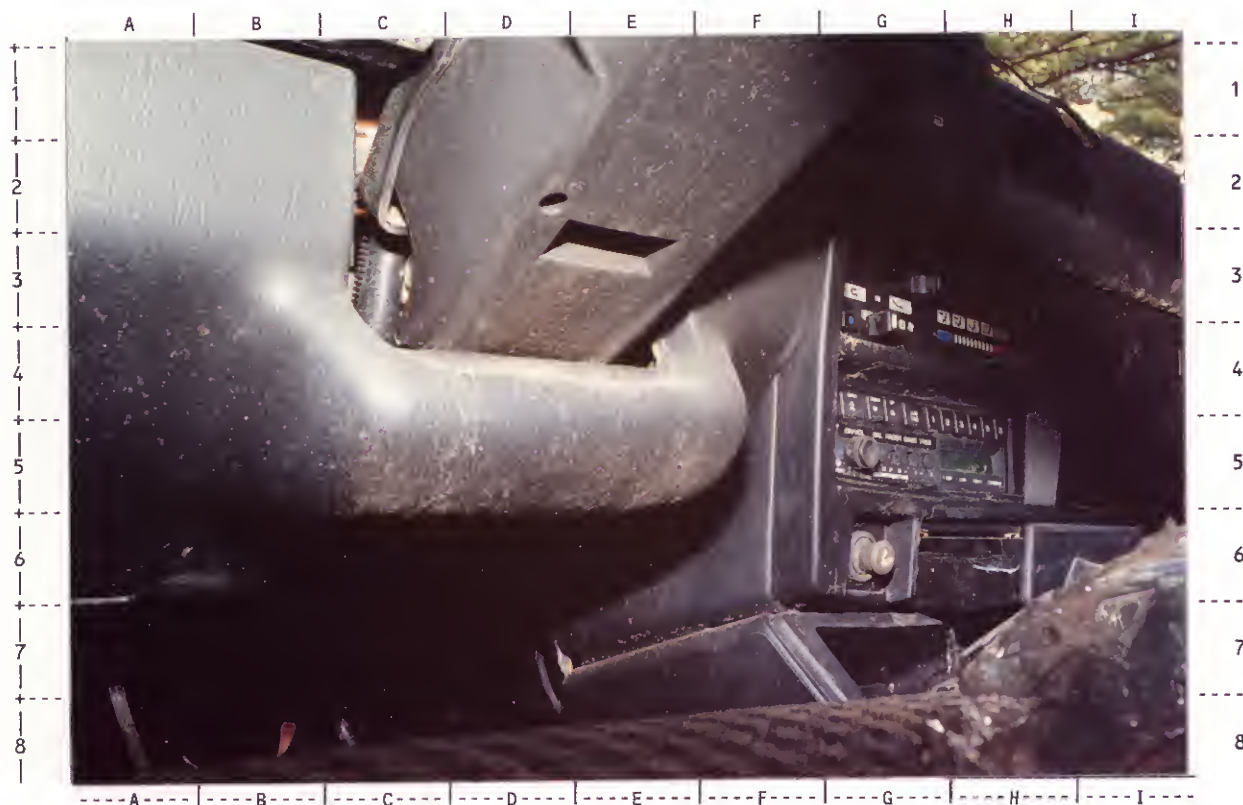
32 -- Interior of Sentra viewed through shattered backlight/hatch; NOTE: driver's side door shows bulging but not passenger door



33 -- Close-up of center of dash including steering wheel, glove compartment, and center floor mounted transmission selector



34 -- Close-up of driver's side & center lower dash & transmission selector viewed from right; NOTE: no evidence of driver contact



35 -- Close-up of driver's side & center lower dash viewed from left;
NOTE: no evidence of driver contacts are present



36 -- Sentra's right dash shows no evidence of driver contact



37 -- Sentra's driver side door shows evidence of occupant loading; see cells C4--E4



38 -- Sentra's steering wheel; NOTE: gouge on rim at approximately 8 o'clock position--see cell D6



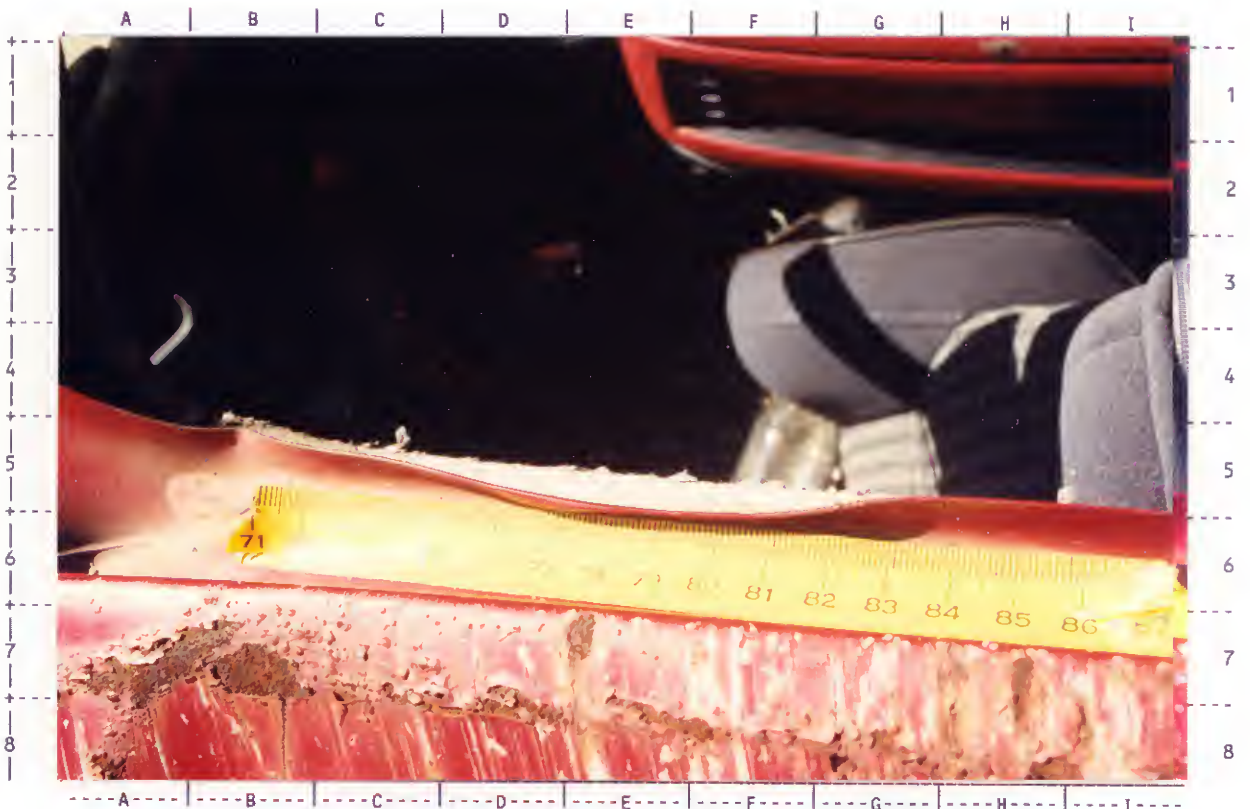
39 -- Right-top view of Sentra's steering wheel rim taken through the sunroof; NOTE: no visible evidence of occupant loading



40 -- Interior view of Sentra's left A-pillar, roof siderail, and sunroof; NOTE: deformation to sunroof--see cell D2



41 -- Left side of top of Sentra's sunroof taken from right-top; NOTE: deformation to lower lip of sunroof--see cells D4--F5



42 -- Close-up of deformed lower lip on left side of Sentra's sunroof; NOTE: uncalibrated side of tape outlines top of roof



43 -- Sentra's right A-pillar, siderail, and deformed right front window frame taken from level of driver's seat



44 -- Left side of Sentra's sunroof & left B-pillar taken from rear center; NOTE: deformation to sunroof's lower lip--cell D6



45 -- Right side of Sentra's sunroof & right B-pillar taken from rear center



46 -- Sentra's front seats taken from right side through windshield area; NOTE: seatback wings on both bucket seats

ACCIDENT COLLISION MEASUREMENT TABLE



U.S. Department of Transportation
National Highway Traffic Safety
Administration

ACCIDENT COLLISION MEASUREMENT TABLE

NATIONAL ACCIDENT SAMPLING SYSTEM
CRASHWORTHINESS DATA SYSTEM

Primary Sampling Unit Number 10

Case Number - Stratum 9404

ACCIDENT COLLISION DIAGRAM		CRASH DATA
<p>LEVEL I PHYSICAL EVIDENCE ABSENT</p> <p>To be accomplished when there is no physical evidence present at the scene:</p> <ul style="list-style-type: none"> • approximate vehicle orientation at impact and final rest • applicable road/roadway delineation (e.g., curbs/edge lines, lane markings, median markings, pavement markings, etc.) • applicable traffic controls (e.g., speed limit) • north arrow placed on diagram • sketch required 	<p>LEVEL II (Cont'd) physical evidence is present:</p> <ul style="list-style-type: none"> • document reference point and reference line relative to physical features present at the scene • scaled documentation of all accident induced physical evidence • scaled documentation of all roadside objects contacted • roadway surface type and condition of applicable roadways • grade measurements for all applicable roadways and at location of rollover initiation • scaled representations of the vehicle(s) at pre-impact, impact, and final rest based upon either: <ul style="list-style-type: none"> e) physical evidence, or b) reconstructed accident dynamics 	<p>VEH. #1 VEH. #2 VEH. #3</p> <p>Heading Angle <u>997</u> — —</p> <p>Surface Type <u>GRASS & DIRT</u></p> <p>Surface Condition <u>DRY</u> — —</p> <p>Grade (v/h) Measurement (between impact and final rest) <u>6/24" = 25%</u></p> <p>Grade (v/h) Measurement (at location of rollover initiation) <u>8/24" = 33%</u></p>
<p>LEVEL II PHYSICAL EVIDENCE PRESENT</p> <p>In addition to the level I tasks noted above, the following must be accomplished when</p>		

Reference Point: Utility pole Reference line: SO. ROAD EDGE

Item	Distance and Direction from Reference Point	Distance and Direction from Reference Line
ROAD HDG angle leading into curve	243°	
RP Dist From ROAD edge	20' N	
HEAD FRP	429' W	
CAR FRP	484' W	
TORSO FRP	501' W	
30 meter CORD MIDDLE	ORD = 65cm	
Lane Widths	12'	

Appendix A:

Police Accident Report

1330

TRAFFIC ACCIDENT REPORT

Account No.

Shaded Areas To Be Used By Data Processing Only

SECRET

Abstract

Local Case No. _____

[illegible]

SEATING	Unit 1 <div style="border: 1px solid black; padding: 2px; display: inline-block;"> 1 24 4 5 6 7 8 9 10 11 </div>		Other Involved Unit (Circle One) 1. Person 13. Rider of Domestic Animal 14. Occ. of Non-Motorized Vehicle 15. Victim of Other Circumstance/ Codes Not Applicable Other Involved Safety Equipment		Unit 2 <div style="border: 1px solid black; padding: 2px; display: inline-block;"> 1 2 3 4 5 6 7 8 9 10 11 </div>		Other Involved Unit (Circle One) 12. Pedestrian 13. Rider of Domestic Animal 14. Occ. of Non-Motorized Vehicle 15. Victim of Other Circumstance/ Codes Not Applicable Other Involved Safety Equipment		CODES															
	<div style="border: 1px solid black; padding: 5px;"> SAFETY EQUIPMENT 21. No (1/2) 22. No (1/2) 23. No (1/2) 24. No (1/2) 25. No (1/2) 26. No (1/2) 27. No (1/2) 28. No (1/2) 29. No (1/2) 30. No (1/2) 31. No (1/2) 32. No (1/2) 33. No (1/2) 34. No (1/2) 35. No (1/2) 36. No (1/2) 37. No (1/2) 38. No (1/2) 39. No (1/2) 40. No (1/2) 41. No (1/2) 42. No (1/2) 43. No (1/2) 44. No (1/2) 45. No (1/2) 46. No (1/2) 47. No (1/2) 48. No (1/2) 49. No (1/2) 50. No (1/2) 51. No (1/2) 52. No (1/2) 53. No (1/2) 54. No (1/2) 55. No (1/2) 56. No (1/2) 57. No (1/2) 58. No (1/2) 59. No (1/2) 60. No (1/2) 61. No (1/2) 62. No (1/2) 63. No (1/2) 64. No (1/2) 65. No (1/2) 66. No (1/2) 67. No (1/2) 68. No (1/2) 69. No (1/2) 70. No (1/2) 71. No (1/2) 72. No (1/2) 73. No (1/2) 74. No (1/2) 75. No (1/2) 76. No (1/2) 77. No (1/2) 78. No (1/2) 79. No (1/2) 80. No (1/2) 81. No (1/2) 82. No (1/2) 83. No (1/2) 84. No (1/2) 85. No (1/2) 86. No (1/2) 87. No (1/2) 88. No (1/2) 89. No (1/2) 90. No (1/2) 91. No (1/2) 92. No (1/2) 93. No (1/2) 94. No (1/2) 95. No (1/2) 96. No (1/2) 97. No (1/2) 98. No (1/2) 99. No (1/2) 100. No (1/2) </div>																							
VICTIMS	Name: _____ Address: _____ Taken to: _____ Taken By: _____ Name: _____ Address: _____ Taken to: _____ Taken By: _____								CODES															
	Injury Type: _____ First Aid By: _____ A - Killed B - Bruise/Abuse/Smoking C - Not Visible - Non-Painful D - Other																							
NARRATIVE AND DIAGRAM																								
Road width Approximate 18 ft. Not to Scale																								
Officer's Opinion of What Happened: <u>Vehicle was traveling west on [redacted] Subject driving was apparently traveling at a high rate of speed. It appeared that she misjudged curve and went out of control. Vehicle ran off road, collided into a ditch and apparently overturned several times before coming to final rest upside down.</u>																								
ROADWAY ENVIRONMENT	For Each Roadway Environment Field, Circle One Entry For Each Involved Unit																							
	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;">Unit 1</td> <td style="width:15%;">Contributing Road Defects</td> <td style="width:10%;">Surface Construction</td> <td style="width:10%;">Condition</td> <td style="width:10%;">Accident In or Related to Road Construction Zone?</td> <td style="width:10%;">Material in Roadway (Contributing)</td> <td style="width:10%;">Material Source</td> <td style="width:10%;">Character</td> </tr> <tr> <td>1</td> <td>1. Shoulders Low 2. Shoulders High 3. Holes, Bumps, Etc. 4. None 8. Other</td> <td>1. Asphalt 2. Concrete 3. Brick 4. Unpaved 8. Other</td> <td>1. Dry 2. Wet 3. Icy 4. Snowy/Slushy 5. Muddy 8. Other</td> <td>Yes Yes No No</td> <td>1. None 2. Rocks 3. Trees/Limos 4. Dirt 5. Gravel 6. Oil/Petrol 8. Other</td> <td>1. Not Applicable 2. Natural Environment 3. Dropped From Vehicle 4. Already in Road, But Fell From Vehicle 8. Other 9. Unknown</td> <td>1. Straight-Level 2. Straight-Down Grade 3. Straight-Up Grade 4. Straight-Midcrest 5. Curve-Level 6. Curve-Down Grade 7. Curve-Up Grade 8. Curve-Midcrest</td> </tr> </table>									Unit 1	Contributing Road Defects	Surface Construction	Condition	Accident In or Related to Road Construction Zone?	Material in Roadway (Contributing)	Material Source	Character	1	1. Shoulders Low 2. Shoulders High 3. Holes, Bumps, Etc. 4. None 8. Other	1. Asphalt 2. Concrete 3. Brick 4. Unpaved 8. Other	1. Dry 2. Wet 3. Icy 4. Snowy/Slushy 5. Muddy 8. Other	Yes Yes No No	1. None 2. Rocks 3. Trees/Limos 4. Dirt 5. Gravel 6. Oil/Petrol 8. Other	1. Not Applicable 2. Natural Environment 3. Dropped From Vehicle 4. Already in Road, But Fell From Vehicle 8. Other 9. Unknown
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<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:30%;"> Witness Full Name: N/A Address: Telephone: </td> <td style="width:30%;"> Name of Investigating Officer: Officer ID: Agency: </td> <td style="width:40%;"> Supervisor Reviewed: Signature of Investigating Officer: </td> </tr> </table>									Witness Full Name: N/A Address: Telephone:	Name of Investigating Officer: Officer ID: Agency:	Supervisor Reviewed: Signature of Investigating Officer:													
Witness Full Name: N/A Address: Telephone:	Name of Investigating Officer: Officer ID: Agency:	Supervisor Reviewed: Signature of Investigating Officer:																						
The data on this report reflects my best knowledge, opinion and belief covering the accident, but no warrant is made as to the factual accuracy thereof. Date: 90																								

Appendix B:

NASS CDS Accident Form



ACCIDENT FORM

NATIONAL ACCIDENT SAMPLING SYSTEM
CRASHWORTHINESS DATA SYSTEM

<div style="border-bottom: 1px solid black; padding-bottom: 5px;"><div style="display: flex; justify-content: space-between;"><div>1. Primary Sampling Unit Number <u>10</u></div><div>2. Case Number - Stratum <u>9404</u></div></div><div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold;">IDENTIFICATION</div><div style="padding-top: 10px;"><div style="display: flex; justify-content: space-between;"><div>3. Number of General Vehicle Forms Submitted <u>01</u></div><div>6. <u> </u> SS15 Administrative Use <u>0</u></div></div><div style="display: flex; justify-content: space-between; margin-top: 10px;"><div>4. Date of Accident (Month, Day, Year) <u> </u> <u>9</u> <u>8</u></div><div>7. <u> </u> SS16 Pedestrian Crash Data Study <u>0</u></div></div><div style="display: flex; justify-content: space-between; margin-top: 10px;"><div>5. Time of Accident <u>1900</u></div><div>8. <u> </u> SS17 Impact Fires <u>0</u></div></div><div style="display: flex; justify-content: space-between; margin-top: 10px;"><div>Code reported military time of accident.</div><div>9. <u> </u> SS18 <u> </u> <u>0</u></div></div><div style="display: flex; justify-content: space-between; margin-top: 10px;"><div>NOTE: Midnight = 2400 Unknown = 9999</div><div>10. <u> </u> SS19 <u> </u> <u>0</u></div></div></div></div>		<div style="background-color: black; color: white; text-align: center; padding: 2px; font-weight: bold;">SPECIAL STUDIES - INDICATORS</div> <div style="padding-top: 10px;">Check <input checked="" type="checkbox"/> each special study (SS14-SS18 below) that has been completed; code 1 for the checked special studies and 0 for the special studies not checked.</div>																																									
NUMBER OF EVENTS																																											
<div style="display: flex; justify-content: space-between;"><div>11. Number of Recorded Events in This Accident <u>01</u></div></div> <div style="margin-top: 10px;">Code the number of events which occurred in this accident.</div>																																											
ACCIDENT EVENTS																																											
For each event that occurred in the accident, code the lowest numbered vehicle in the left columns and the other involved vehicle or object on the right.																																											
<table border="1" style="width: 100%; border-collapse: collapse;"><thead><tr><th style="width: 12.5%;">Accident Event Sequence Number</th><th style="width: 12.5%;">Vehicle Number</th><th style="width: 12.5%;">Class Of Vehicle</th><th style="width: 12.5%;">General Area of Damage</th><th style="width: 12.5%;">Vehicle Number or Object Contacted</th><th style="width: 12.5%;">Class Of Vehicle</th><th style="width: 12.5%;">General Area of Damage</th></tr></thead><tbody><tr><td>12. <u>0</u> <u>1</u></td><td>13. <u>01</u></td><td>14. <u>01</u></td><td>15. <u>T</u></td><td>16. <u>31</u></td><td>17. <u>00</u></td><td>18. <u>N</u></td></tr><tr><td>19. <u>0</u> <u>2</u></td><td>20. <u> </u></td><td>21. <u> </u></td><td>22. <u> </u></td><td>23. <u> </u></td><td>24. <u> </u></td><td>25. <u> </u></td></tr><tr><td>26. <u>0</u> <u>3</u></td><td>27. <u> </u></td><td>28. <u> </u></td><td>29. <u> </u></td><td>30. <u> </u></td><td>31. <u> </u></td><td>32. <u> </u></td></tr><tr><td>33. <u>0</u> <u>4</u></td><td>34. <u> </u></td><td>35. <u> </u></td><td>36. <u> </u></td><td>37. <u> </u></td><td>38. <u> </u></td><td>39. <u> </u></td></tr><tr><td>40. <u>0</u> <u>5</u></td><td>41. <u> </u></td><td>42. <u> </u></td><td>43. <u> </u></td><td>44. <u> </u></td><td>45. <u> </u></td><td>46. <u> </u></td></tr></tbody></table>		Accident Event Sequence Number	Vehicle Number	Class Of Vehicle	General Area of Damage	Vehicle Number or Object Contacted	Class Of Vehicle	General Area of Damage	12. <u>0</u> <u>1</u>	13. <u>01</u>	14. <u>01</u>	15. <u>T</u>	16. <u>31</u>	17. <u>00</u>	18. <u>N</u>	19. <u>0</u> <u>2</u>	20. <u> </u>	21. <u> </u>	22. <u> </u>	23. <u> </u>	24. <u> </u>	25. <u> </u>	26. <u>0</u> <u>3</u>	27. <u> </u>	28. <u> </u>	29. <u> </u>	30. <u> </u>	31. <u> </u>	32. <u> </u>	33. <u>0</u> <u>4</u>	34. <u> </u>	35. <u> </u>	36. <u> </u>	37. <u> </u>	38. <u> </u>	39. <u> </u>	40. <u>0</u> <u>5</u>	41. <u> </u>	42. <u> </u>	43. <u> </u>	44. <u> </u>	45. <u> </u>	46. <u> </u>
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IF GREATER THAN FIVE EVENTS, CONTINUE CODING ON THE ACCIDENT EVENT SUPPLEMENT																																											

CODES FOR CLASS OF VEHICLE

- (00) Not a motor vehicle
- (01) Subcompact/mini (wheelbase < 254 cm)
- (02) Compact (wheelbase ≥ 254 but < 265 cm)
- (03) Intermediate (wheelbase ≥ 265 but < 278 cm)
- (04) Full size (wheelbase ≥ 278 but < 291 cm)
- (05) Largest (wheelbase ≥ 291 cm)
- (09) Unknown passenger car size
- (11) Compact utility vehicle
- (12) Large utility vehicle (≤ 4,500 kgs GVWR)
- (13) Passenger van (≤ 4,500 kgs GVWR)
- (14) Other van (≤ 4,500 kgs GVWR)
- (15) Pickup truck (≤ 4,500 kgs GVWR)
- (18) Other truck (≤ 4,500 kgs GVWR)
- (19) Unknown light truck type
- (20) School bus
- (21) Other bus
- (22) Truck (> 4,500 kgs GVWR)
- (23) Tractor without trailer
- (24) Tractor-trailer(s)
- (25) Motored cycle
- (28) Other vehicle
- (99) Unknown

CODES FOR GENERAL AREA OF DAMAGE (GAD)

CDS APPLICABLE AND OTHER VEHICLES

- (O) Not a motor vehicle
- (N) Noncollision
- (F) Front
- (R) Right side
- (L) Left side
- (B) Back
- (T) Top
- (U) Undercarriage
- (9) Unknown

TDC APPLICABLE VEHICLES

- (O) Not a motor vehicle
- (N) Noncollision
- (F) Front
- (R) Right side
- (L) Left side
- (B) Back of unit with cargo area (rear of trailer or straight truck)
- (D) Back (rear of tractor)
- (C) Rear of cab
- (V) Front of cargo area
- (T) Top
- (U) Undercarriage
- (9) Unknown

CODES FOR VEHICLE NUMBER OR OBJECT CONTACTED

(01-30) — Vehicle Number

Noncollision

- (31) Overturn — rollover
- (32) Fire or explosion
- (33) Jackknife
- (34) Other intraunit damage (specify): _____

- (35) Noncollision injury
- (38) Other noncollision (specify): _____

- (39) Noncollision — details unknown

Collision With Fixed Object

- (41) Tree (≤ 10 cm in diameter)
- (42) Tree (> 10 cm in diameter)
- (43) Shrubbery or bush
- (44) Embankment

- (45) Breakaway pole or post (any diameter)

Nonbreakaway Pole or Post

- (50) Pole or post (≤ 10 cm in diameter)
- (51) Pole or post (> 10 cm but ≤ 30 cm in diameter)
- (52) Pole or post (> 30 cm in diameter)
- (53) Pole or post (diameter unknown)

- (54) Concrete traffic barrier
- (55) Impact attenuator
- (56) Other traffic barrier (includes guardrail)
(specify): _____

- (57) Fence
- (58) Wall
- (59) Building
- (60) Ditch or culvert
- (61) Ground
- (62) Fire hydrant
- (63) Curb
- (64) Bridge
- (68) Other fixed object (specify): _____

- (69) Unknown fixed object

Collision with Nonfixed Object

- (71) Motor vehicle not in-transport
- (72) Pedestrian
- (73) Cyclist or cycle
- (74) Other nonmotorist or conveyance

- (75) Vehicle occupant

- (76) Animal

- (77) Train

- (78) Trailer, disconnected in transport

- (79) Object fell from vehicle in-transport

- (88) Other nonfixed object (specify): _____

- (89) Unknown nonfixed object

- (98) Other event (specify): _____

- (99) Unknown event or object

Appendix C:

NASS CDS Vehicle Forms



GENERAL VEHICLE FORM

NATIONAL ACCIDENT SAMPLING SYSTEM
CRASHWORTHINESS DATA SYSTEM

1. Primary Sampling Unit Number 10
2. Case Number - Stratum 9404
3. Vehicle Number 01

VEHICLE IDENTIFICATION

4. Vehicle Model Year 89
Code the last two digits of the model year
(99) Unknown
5. Vehicle Make (specify): NISSAN 35
Applicable codes are found in your
NASS Data Collection, Coding and
Editing Manual.
(99) Unknown

6. Vehicle Model (specify): Sentra 043
Applicable codes are found in your
NASS Data Collection, Coding and
Editing Manual.
(999) Unknown

7. Body Type 03
Note: Applicable codes may be found on
the back of this page.

8. Vehicle Identification Number
1N16B24P8KU
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Left justify; Slash zeros and letter Z (0 and Z)
No VIN—Code all zeros
Unknown—Code all nines

OFFICIAL RECORDS

9. Police Reported Vehicle Disposition 1
(0) Not towed due to vehicle damage
(1) Towed due to vehicle damage
(9) Unknown
10. Police Reported Travel Speed 121
Code to the nearest kph (NOTE: 000 means
less than 0.5 kph)
(160) 159.5 kph and above
(999) Unknown
75 mph X 1.6093 = 121 kph

11. Police Reported Alcohol Presence 9
(0) No alcohol present
(1) Yes (alcohol present)
(7) Not reported
(8) No driver present
(9) Unknown

Note: See variables 37 through 55
(Page 4) for information on Other Drugs

12. Alcohol Test Result For Driver 00
Code actual value (decimal implied
before first digit—0.xx)
(95) Test refused
(96) None given
(97) AC test performed, results unknown
(98) No driver present
(99) Unknown

Source: Autopsy

ACCIDENT RELATED

13. Speed Limit 089
(000) No statutory limit
Code posted or statutory speed limit
in kph
(999) Unknown

55 mph X 1.6093 = 89 kph

14. Attempted Avoidance Maneuver 99
(01) No avoidance actions
(02) Braking (no lockup)
(03) Braking (lockup)
(04) Braking (lockup unknown)
(05) Releasing brakes
(06) Steering left
(07) Steering right
(08) Braking and steering left
(09) Braking and steering right
(10) Accelerating
(11) Accelerating and steering left
(12) Accelerating and steering right
(97) No driver present
(98) Other action (specify):
(99) Unknown

15. Accident Type 07
Applicable codes may be found on the
back of page two of this field form
(0) No impact
Code the number of the diagram that
best describes the accident circumstance
(98) Other accident type (specify):
(99) Unknown

**** SKIP TO VARIABLE GV37 IF GV07 DOES NOT EQUAL 01-49 ****

OCCUPANT RELATED

16. Driver Presence in Vehicle 1
 (0) Driver not present
 (1) Driver present
 (9) Unknown
17. Number of Occupants This Vehicle 01
 (00-96) Code actual number of occupants for this vehicle
 (97) 97 or more
 (99) Unknown
18. Number of Occupant Forms Submitted 01

VEHICLE WEIGHT ITEMS

19. Vehicle Curb Weight 1,050
 Code weight to nearest 10 kilograms.
 (045) Less than 450 kilograms
 (610) 6,100 kilograms or more
 (999) Unknown
 _____ lbs X .4536 = 1,045 kgs
 Source: _____
20. Vehicle Cargo Weight 9990
 Code weight to nearest 10 kilograms.
 (000) Less than 5 kilograms
 (450) 4,500 kilograms or more
 (999) Unknown
 _____ lbs X .4536 = _____ kgs

RECONSTRUCTION DATA

21. Towed Trailing Unit 0
 (0) No towed unit
 (1) Yes—towed trailing unit
 (9) Unknown
22. Documentation of Trajectory Data for This Vehicle 0
 (0) No
 (1) Yes
23. Post Collision Condition of Tree or Pole (I or Highest Delta V) 0
 (0) Not collision (for highest delta V) with tree or pole
 (1) Not damaged
 (2) Cracked/sheared
 (3) Tilted <45 degrees
 (4) Tilted ≥45 degrees
 (5) Uprooted tree
 (6) Separated pole from base
 (7) Pole replaced
 (8) Other (specify): _____
 (9) Unknown

24. Rollover

(0) No rollover (no overturning)

Rollover (primarily about the longitudinal axis)

- (1) Rollover, 1 quarter turn only
 (2) Rollover, 2 quarter turns
 (3) Rollover, 3 quarter turns
 (4) Rollover, 4 or more quarter turns (specify): _____

(5) Rollover—end-over-end (i.e., primarily about the lateral axis)

(9) Rollover (overturn), details unknown

OVERRIDE/UNDERRIDE (THIS VEHICLE)

25. Front Override/Underride (this Vehicle) 026. Rear Override/Underride (this Vehicle) 0

(0) No override/underride, or not an end-to-end impact

Override (see specific CDC)

- (1) 1st CDC
 (2) 2nd CDC
 (3) Other not automated CDC (specify): _____

Underride (see specific CDC)

- (4) 1st CDC
 (5) 2nd CDC
 (6) Other not automated CDC (specify): _____

(7) Medium/heavy truck or bus override

(9) Unknown

HEADING ANGLE AT IMPACT FOR HIGHEST DELTA V

Values: (000)-(359) Code actual value
 (997) Noncollision
 (998) Impact with object
 (999) Unknown

27. Heading Angle For This Vehicle 99728. Heading Angle For Other Vehicle 997

29. Basis for Total Delta V (highest)

5*Delta V Calculated*

- (1) CRASH program—damage only routine
- (2) CRASH program—damage and trajectory routine
- (3) Missing vehicle algorithm

Delta V Not Calculated

- (4) At least one vehicle (which may be this vehicle) is beyond the scope of an acceptable reconstruction program, regardless of collision conditions.
- (5) All vehicles within scope (CDC applicable) of CRASH program but one of the collision conditions is beyond the scope of the CRASH program or other acceptable reconstruction technique, regardless of adequacy of damage data.
- (6) All vehicle and collision conditions are within scope of one of the acceptable reconstruction programs, but there is insufficient data available.

COMPUTER GENERATED DELTA V

30. Total Delta V

Highest

999

_____ Nearest kph (highest)

_____ Nearest kph (secondary)

(NOTE: 000 means less than
0.5 kph)
(160) 159.5 kph and above
(999) Unknown

31. Longitudinal Component of
Delta V+ 999

_____ Nearest kph (highest):

_____ Nearest kph (secondary)

(NOTE: 000 means greater than
-0.5 kph and less than +0.5 kph)
(± 160) ± 159.5 kph and above
(999) Unknown

32. Lateral Component of Delta V

Highest

+ 999

_____ Nearest kph (highest)

_____ Nearest kph (secondary)

(NOTE: 000 means greater than
-0.5 kph and less than +0.5 kph)
(± 160) ± 159.5 kph and above
(999) Unknown

33. Energy Absorption

999.9 00

_____ Nearest 100 joules (highest)

_____ Nearest 100 joules (secondary)

(NOTE: 0000 means less than 50 joules)
(9997) 999,650 joules or more
(9999) Unknown

34. Confidence In Reconstruction Program
Results (For Highest Delta V)

- (0) No reconstruction
- (1) Collision fits model — results appear reasonable
- (2) Collision fits model — results appear high
- (3) Collision fits model — results appear low
- (4) Borderline reconstruction — results appear reasonable

4

35. Type of Vehicle Inspection

- (0) No inspection
- (1) Complete inspection
- (2) Partial inspection (specify):
no contour gage
used.

2

36. Is this an AOPS Vehicle?

- (0) No
- (1) Yes - researcher determined
- (2) VIN determined air bag system
- (3) VIN determined automatic (passive) belts
- (4) VIN determined air bag and automatic (passive) belts

1

IS OLDMISS APPLICABLE FOR THIS VEHICLE? [] YES [/] NO

IF YES: IS A COMPLETED OLDMISS PROGRAM SUMMARY INCLUDED? [] YES [] NO

37. Police Reported Other Drug Presence 9

- (0) No other drug(s) present
 (1) Yes [other drug(s) present]
 (7) Not reported
 (8) No driver present
 (9) Unknown

38. Police Reported Drug Evaluation Classification 0

- (DEC) Test For Driver
 (0) No DEC process available or given
 (1) DEC process given, results known
 (2) DEC process given, results unknown
 (3) DEC process available, unknown if given
 (8) No driver present

39. Other Drug Specimen Test Type For Driver 1

- (0) No specimen test given
 (1) Blood test
 (2) Urine test
 (3) Other specimen tests (specify):

 (7) Unspecified specimen test
 (8) No driver present
 (9) Unknown if specimen test given

DRUG EVALUATION CLASSIFICATION

OTHER DRUGS TEST RESULTS FOR DRIVER

	DEC Test Results	Specimen Test Results
Narcotic Drug	40. <u>0</u>	41. <u>7</u>
Depressant Drug	42. <u>0</u>	43. <u>7</u>
Stimulant Drug	44. <u>0</u>	45. <u>7</u>
Hallucinogen Drug	46. <u>0</u>	47. <u>7</u>
Cannabinoid Drug	48. <u>0</u>	49. <u>1</u>
Phencyclidine (PCP)	50. <u>0</u>	51. <u>7</u>
Inhalant Drug	52. <u>0</u>	53. <u>7</u>
Other Drug (Excluding Nicotine, Aspirin, Alcohol, Drugs Administered Post-Crash)	54. <u>0</u>	55. <u>7</u>

Codes For DEC Test Results

- (0) No DEC test given
 (1) Passed DEC test
 (2) Failed DEC test
 (3) DEC test given—results unknown
 (8) No driver present
 (9) Unknown if DEC test given

Codes for Specimen Test Results

- (0) No specimen test given
 (1) Drug not found in specimen
 (2) Drug found in specimen
 (7) Specimen test given, results unknown or
not obtained
 (8) No driver present
 (9) Unknown if specimen test given

OTHER DATA

56. Driver's Zip Code

- (00000) Driver not present
(00001) Driver not a resident of U.S. or territories
Code actual 5-digit zip code
(99999) Unknown

57. Driver's Race/Ethnic Origin

- (0) Driver not present
(1) White (non-Hispanic)
(2) Black (non-Hispanic)
(3) White (Hispanic)
(4) Black (Hispanic)
(5) American Indian, Eskimo or Aleut
(6) Asian or Pacific Islander
(8) Other (specify):
(9) Unknown

58. Vehicle Special Use (This Trip)

- (0) No special use
(1) Taxi
(2) Vehicle used as school bus
(3) Vehicle used as other bus
(4) Military
(5) Police
(6) Ambulance
(7) Fire truck or car
(8) Other (specify):
(9) Unknown

ROLLOVER DATA

If GV07 (Body Type) \neq 1-49, leave GV59-GV63 blank.
If GV24 (Rollover) = 0, then GV59-GV63 must equal 0.
If GV24 = 9, then GV59-GV63 must equal 9.

59. Rollover Initiation Type

- (0) No rollover
(1) Trip-over
(2) Flip-over
(3) Turn-over
(4) Climb-over
(5) Fall-over
(6) Bounce-over
(7) Collision with another vehicle
(8) Other rollover initiation type (specify):
(9) Unknown rollover initiation type

60. Location of Rollover Initiation

- (0) No rollover
(1) On roadway
(2) On shoulder—paved
(3) On shoulder—unpaved
(4) On roadside or divided trafficway median
(9) Unknown

61. Rollover Initiation Object Contacted

62. Location on Vehicle Where Initial Principal Tripping Force Is Applied

- (0) No rollover
(1) Wheels/tires
(2) Side plane
(3) End plane
(4) Undercarriage
(5) Other location on vehicle (specify):
(8) Non-contact rollover forces (specify):
(9) Unknown

63. Direction of Initial Roll

- (0) No rollover
(1) Roll right - primarily about the longitudinal axis
(2) Roll left - primarily about the longitudinal axis
(5) End-over-end (i.e., primarily about the lateral axis)
(9) Unknown roll direction

PRECRASH DATA

64. Pre-Event Movement (Prior to Recognition of Critical Event)

- (01) Going straight
(02) Slowing or stopping in traffic lane
(03) Starting in traffic lane
(04) Stopped in traffic lane
(05) Passing or overtaking another vehicle
(06) Disabled or parked in travel lane
(07) Leaving a parking position
(08) Entering a parking position
(09) Turning right
(10) Turning left
(11) Making a U-turn
(12) Backing up (other than for parking position)
(13) Negotiating a curve
(14) Changing lanes
(15) Merging
(16) Successful avoidance maneuver to a previous critical event
(97) Other (specify):
(98) No driver present
(99) Unknown

PRECRASH DATA (Continued)

65. Critical Precrash Event Φ 6

This Vehicle Loss of Control Due To:

- (01) Blow out or flat tire
- (02) Stalled engine
- (03) Disabling vehicle failure (e.g., wheel fell off) (specify): _____
- (04) Non-disabling vehicle problem (e.g., hood flew up) (specify): _____
- (05) Poor road conditions (puddle, pot hole, ice, etc.) (specify): _____
- (06) Traveling too fast for conditions
- (08) Other cause of control loss (specify): _____
- (09) Unknown cause of control loss

This Vehicle Traveling

- (10) Over the lane line on left side of travel lane
- (11) Over the lane line on right side of travel lane
- (12) Off the edge of the road on the left side
- (13) Off the edge of the road on the right side
- (14) End departure
- (15) Turning left at intersection
- (16) Turning right at intersection
- (17) Crossing over (passing through) intersection
- (19) Unknown travel direction

Other Motor Vehicle In Lane

- (50) Stopped
- (51) Traveling in same direction with lower speed (i.e., lower steady speed or decelerating)
- (52) Traveling in same direction with higher speed
- (53) Traveling in opposite direction
- (54) In crossover
- (55) Backing
- (59) Unknown travel direction of other motor vehicle in lane

Other Motor Vehicle Encroaching Into Lane

- (60) From adjacent lane (same direction)—over left lane line
- (61) From adjacent lane (same direction)—over right lane line
- (62) From opposite direction—over left lane line
- (63) From opposite direction—over right lane line
- (64) From parking lane
- (65) From crossing street, turning into same direction
- (66) From crossing street, across path
- (67) From crossing street, turning into opposite direction
- (68) From crossing street, intended path not known
- (70) From driveway, turning into same direction
- (71) From driveway, across path
- (72) From driveway, turning into opposite direction
- (73) From driveway, intended path not known
- (74) From entrance to limited access highway
- (78) Encroachment by other vehicle—details unknown

Pedestrian or Pedalcyclist, or Other Nonmotorist

- (80) Pedestrian in roadway
- (81) Pedestrian approaching roadway
- (82) Pedestrian—unknown location
- (83) Pedalcyclist or other nonmotorist in roadway (specify): _____
- (84) Pedalcyclist or other nonmotorist approaching roadway (specify): _____
- (85) Pedalcyclist or other nonmotorist—unknown location (specify): _____

Object or Animal

- (87) Animal in roadway
- (88) Animal approaching roadway
- (89) Animal—unknown location
- (90) Object in roadway
- (91) Object approaching roadway
- (92) Object—unknown location

(98) Other critical precrash event (specify): _____

(99) Unknown

For Corrective Actions Attempted see variable GV14 (Attempted Avoidance Manuever)

66. Precrash Stability After Avoidance Maneuver 9

- (0) No avoidance maneuver
- (1) Tracking
- (2) Skidding longitudinally—rotation less than 30 degrees
- (3) Skidding laterally—clockwise rotation
- (4) Skidding laterally—counterclockwise rotation
- (7) Other vehicle loss-of-control (specify): _____
- (8) No driver present
- (9) Precrash stability unknown

67. Precrash Directional Consequences of Avoidance Maneuver (Corrective Action) 9

- (0) No avoidance maneuver
- (1) Vehicle stayed in travel lane where avoidance maneuver was initiated
- (2) Vehicle stayed on roadway but left travel lane where avoidance maneuver was initiated
- (3) Vehicle stayed on roadway, not known if left travel lane where avoidance maneuver was initiated
- (4) Vehicle departed roadway
- (5) Avoidance maneuver initiated off roadway
- (8) No driver present
- (9) Directional consequences unknown

*** IF THE CDS APPLICABLE VEHICLE WAS NOT INSPECTED (I.E., GV35 = 0), ***
DO NOT COMPLETE THE EXTERIOR AND INTERIOR VEHICLE FORMS.

*** IF GV07 DOES NOT EQUAL 01-49, DO NOT COMPLETE ***
THE EXTERIOR VEHICLE, INTERIOR VEHICLE,
OCCUPANT ASSESSMENT, AND OCCUPANT INJURY FORMS.

VINASSIST Version 1.04

(c) 1991

Law Enforcement Edition

VIN: JN1GB24P8KU [REDACTED]

DIGIT	DESCRIPTION	MEANING
J	Country of Origin	JAPAN
N	Manufacturer	NISS NISSAN
1	Vehicle Type	PASSENGER CAR
G	Engine	1597CC OHC SPFI
B	Line	SENTRA
2	Model	SENTRA / STANZA
4	Body Style	2 DR COUPE/2 DR HATCHBACK
P	Restraint System	AUTOMATIC BELT SYSTEM (2WD)
8	Check Digit	CHECK DIGIT VALID
K	Year	1989
U	Assembly Plant	
[REDACTED]	Sequence Number	IN RANGE

***** VIN Passed Test *****

VIN indicates a 1989 NISSAN SENTRA

(c) 1991

VINASSIST Version 1.04

(c) 1991

Law Enforcement Edition

VIN:JN1GB24P8K4

DIGIT	DESCRIPTION	MEANING
J	Country of Origin	JAPAN
N	Manufacturer	NISS NISSAN
1	Vehicle Type	PASSENGER CAR
G	Engine	1597CC OHC SPFI
B	Line	SENTRA
2	Model	SENTRA / STANZA
4	Body Style	2 DR COUPE/2 DR HATCHBACK
P	Restraint System	AUTOMATIC BELT SYSTEM (2WD)
8	Check Digit	CHECK DIGIT VALID
K	Year	1989
4	Assembly Plant	* Digit Undefined
	Sequence Number	* Range Undetermined

--VIN Failed Test--

* Invalid Digit

VIN indicates a 1989 NISSAN SENTRA

(c) 1991

EXTERIOR VEHICLE FORM

**NATIONAL ACCIDENT SAMPLING SYSTEM
CRASHWORTHINESS DATA SYSTEM**

1. Primary Sampling Unit Number <u>10</u> 2. Case Number - Stratum <u>9404</u>	3. Vehicle Number <u>01</u>
---	-----------------------------

VEHICLE IDENTIFICATION

VIN JN1GB24P8KU _____ Model Year 89
Vehicle Make (specify): NISSAN Vehicle Model (specify): Sentra

LOCATOR

Locate the end of the damage with respect to the vehicle longitudinal center line or bumper corner for end impacts or an undamaged axle for side impacts.

Specific Impact No.	Location of Direct Damage	Location of Field L
1	across front END	
2	TOP	

CRUSH PROFILE IN CENTIMETERS

NOTES: Identify the plane at which the C-measurements are taken (e.g., at bumper, above bumper, at sill, above sill, etc.) and label adjustments (e.g., free space).

Measure and document on the vehicle diagram the location of maximum crush.

Measure C1 to C6 from driver to passenger side in front or rear impacts and rear to front in side impacts.

Free space value is defined as the distance between the baseline and the original body contour taken at the individual C locations. This may include the following: bumper lead, bumper taper, side protrusion, side taper, etc. Record the value for each C-measurement and maximum crush.

Use as many lines/columns as necessary to describe each damage profile.

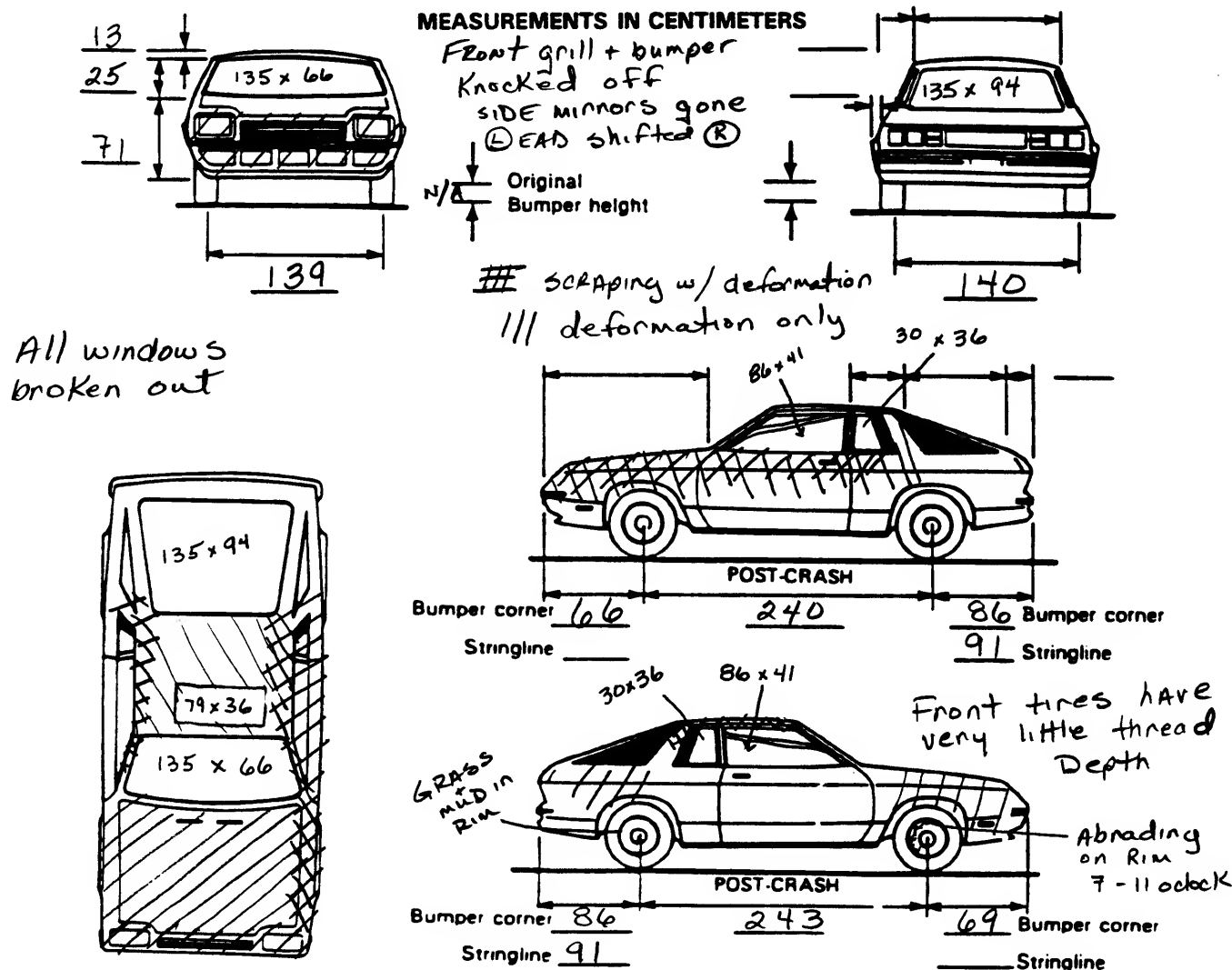
[illegible]

ORIGINAL SPECIFICATIONS WORK SHEET

Wheelbase	<u>95.7</u>	inches	x 2.54	=	<u>243</u>	cm
Overall Length	<u>166.5</u>	inches	x 2.54	=	<u>423</u>	cm
Maximum Width	<u>65.6</u>	inches	x 2.54	=	<u>167</u>	cm
Curb Weight	<u>2,304</u>	pounds	x .4536	=	<u>1,045</u>	kg
Average Track	<u>56.5</u>	inches	x 2.54	=	<u>144</u>	cm
Front Overhang	<u> </u>	inches	x 2.54	=	<u>95</u>	cm
Rear Overhang	<u> </u>	inches	x 2.54	=	<u>84</u>	cm
Undeformed End Width	<u>58.5</u>	inches	x 2.54	=	<u>149</u>	cm
Engine Size: cyl./displ.	<u> </u>	cc	x .001	=	<u>1.6</u>	L
	<u> </u>	CID	x .0164	=	<u> </u>	L

VEHICLE DAMAGE SKETCH

TIRE—WHEEL DAMAGE a. Rotation physically restricted RF <u>2</u> LF <u>1</u> RR <u>2</u> LR <u>2</u> (1) Yes (2) No (8) NA (9) Unk.		ORIGINAL SPECIFICATIONS Wheelbase <u>243</u> cm Overall Length <u>423</u> cm Maximum Width <u>167</u> cm Curb Weight <u>1045</u> kg Average Track <u>144</u> cm Front Overhang <u>95</u> cm Rear Overhang <u>84</u> cm Undeformed End Width <u>149</u> cm Engine Size: cyl./displ. <u>1.6</u> L		WHEEL STEER ANGLES (For locked front wheels or displaced rear axles only) RF \pm <u> </u> ° LF \pm <u>15</u> ° RR \pm <u> </u> ° LR \pm <u> </u> ° Within \pm 5 degrees
TYPE OF TRANSMISSION <input type="checkbox"/> Manual <input type="checkbox"/> Automatic		DRIVE WHEELS <input type="checkbox"/> FWD <input type="checkbox"/> RWD <input type="checkbox"/> 4WD		
		Approximate Cargo Weight <u>UNK</u> kg		



NOTES Sketch new perimeter and cross hatch direct damage and single hatch induced damage on all views. Annotate observations which might be useful in reconstructing the accident (e.g., grass in tire bead, direction of stations, scuff on sidewalls, etc.). If pulling trailer, sketch type of trailer and damage received on the back of this page.

Annotate any damage caused by extrication such as component removal by torching, prying, or hydraulic shears.

CDC WORKSHEET

CODES FOR OBJECT CONTACTED

(01-30) – Vehicle Number

Noncollision

- (31) Overturn — rollover
(32) Fire or explosion
(33) Jackknife
(34) Other intraunit damage (specify):

(35) Noncollision injury

(38) Other noncollision (specify):

(39) Noncollision — details unknown

Collision With Fixed Object

- (41) Tree (≤ 10 cm in diameter)
(42) Tree (> 10 cm in diameter)
(43) Shrubbery or bush
(44) Embankment

(45) Breakaway pole or post (any diameter)

Nonbreakaway Pole or Post

- (50) Pole or post (≤ 10 cm in diameter)
(51) Pole or post (> 10 cm but ≤ 30 cm in diameter)
(52) Pole or post (> 30 cm in diameter)
(53) Pole or post (diameter unknown)

- (54) Concrete traffic barrier
(55) Impact attenuator
(56) Other traffic barrier (includes guardrail)
(specify):

- (57) Fence
(58) Wall
(59) Building
(60) Ditch or culvert
(61) Ground
(62) Fire hydrant
(63) Curb
(64) Bridge
(68) Other fixed object (specify):

(69) Unknown fixed object

Collision with Nonfixed Object

- (71) Motor vehicle not in-transport
(72) Pedestrian
(73) Cyclist or cycle
(74) Other nonmotorist or conveyance

(75) Vehicle occupant

(76) Animal

(77) **Train**

(78) Trailer, disconnected in transport

(79) Object fell from vehicle in-transport

(88) Other nonfixed object (specify):

(89) Unknown nonfixed object

(98) Other event (specify):

(99) Unknown event or object

DEFORMATION CLASSIFICATION BY EVENT NUMBER

[illegible]

COLLISION DEFORMATION CLASSIFICATION

HIGHEST DELTA "V"

Accident Event Sequence Number	Object Contacted	(1) (2) Direction of Force	(3) Deformation Location	(4) Longitudinal or Lateral Location	(5) Vertical or Lateral Location	(6) Type of Damage Distribution	(7) Deformation Extent
4. <u>01</u>	5. <u>61</u>	6. <u>00</u>	7. <u>T</u>	8. <u>D</u>	9. <u>D</u>	10. <u>0</u>	11. <u>04</u>

Second Highest Delta "V"

12. <u> </u>	13. <u> </u>	14. <u> </u>	15. <u> </u>	16. <u> </u>	17. <u> </u>	18. <u> </u>	19. <u> </u>
-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------	-----------------

CRUSH PROFILE IN CENTIMETERS

The crush profile for the damage described in the CDC(s) above should be documented in the appropriate space below. (ALL MEASUREMENTS ARE IN CENTIMETERS.)

HIGHEST DELTA "V"

20. <u>L</u>	21. <u>C₁</u>	<u>C₂</u>	<u>C₃</u>	<u>C₄</u>	<u>C₅</u>	<u>C₆</u>	22. <u>±D</u>
							<u>+</u>
							<u>-</u>

Second Highest Delta "V"

23. <u>L</u>	24. <u>C₁</u>	<u>C₂</u>	<u>C₃</u>	<u>C₄</u>	<u>C₅</u>	<u>C₆</u>	25. <u>±D</u>
							<u>+</u>
							<u>-</u>

26. Are CDCs Documented but Not Coded on The Automated File? ①
(0) No
(1) Yes

27. Researcher's Assessment of Vehicle Disposition 1
(0) Not towed due to vehicle damage
(1) Towed due to vehicle damage
(9) Unknown

28. Original Wheelbase 243
Code to the nearest centimeter
(999) Unknown

95.7 inches X 2.54 = 243 centimeters

29. Is This A Multi-Stage Manufactured Vehicle
And/Or A Certified Altered Vehicle?

- (0) No post manufacturer modifications
(1) Yes - post manufacturer modifications
(specify): _____

(Include photograph of CERTIFICATION
PLACARD in case report)

- (9) Unknown if vehicle is modified

30. Fire Occurrence

- (0) No fire

Yes, fire occurred

- (1) Minor
(2) Major
(9) Unknown

31. Origin of Fire

- (0) No fire
(1) Vehicle exterior (front, side, back, top)
(2) Exhaust system
(3) Fuel tank (and other fuel retention
system parts)
(4) Engine compartment
(5) Cargo/trunk compartment
(6) Instrument panel
(7) Passenger compartment area
(8) Other location (specify): _____

- (9) Unknown

32. Type of Fuel Tank-1

33. Type of Fuel Tank-2

- (0) No fuel tank (electrical vehicle)
(1) Metallic
(2) Non-metallic
(9) Unknown

34. Fuel Tank-1 Location

35. Fuel Tank-2 Location

- (0) No fuel tank
(1) Aft of center of the rear wheels (rear axle)
centered
(2) Aft of center of the rear wheels (rear axle)
left side
(3) Aft of center of the rear wheels (rear axle)
right side
(4) Forward of center of the rear wheels (rear
axle) centered
(5) Forward of center of the rear wheels (rear
axle) left side
(6) Forward of center of the rear wheels (rear
axle) right side
(7) Over center of the rear wheels (rear axle)
(8) Other (specify): _____
(9) Unknown

36. Fuel Tank-1 Filler Cap Location

37. Fuel Tank-2 Filler Cap Location

- (0) No fuel tank
(1) On back plane
(2) Aft of center of the rear wheels (rear axle) on
left side plane
(3) Aft of center of the rear wheels (rear axle) on
right side plane
(4) Forward of center of the rear wheels (rear
axle) on left side plane
(5) Forward of center of the rear wheels (rear
axle) on right side plane
(6) Over the center of the rear wheels (rear axle)
on left side plane
(7) Over the center of the rear wheels (rear axle)
on right side plane
(8) Other (specify): _____
(9) Unknown

38. Fuel Tank-1 Damage

39. Fuel Tank-2 Damage

- (0) No fuel tank
(1) No damage to fuel tank
(2) Deformed, no seam failure
(3) Deformed, with a seam failure
(4) Punctured
(5) Lacerated (ripped)
(6) Abraded (scraped)
(7) Filler neck separation from the fuel tank
(8) Other damage (specify): _____
(9) Unknown

<p>40. Location of Fuel System-1 Leakage</p> <p style="text-align: right;"><u>1</u></p> <p>41. Location of Fuel System-2 Leakage</p> <p>(0) No fuel tank (1) No fuel leakage</p> <p><i>Primary Area Of Leakage</i></p> <p>(2) Tank (3) Filler neck (4) Cap (5) Lines/pump/filter (6) Vent/emission recovery (8) Other (specify): _____</p> <p>(9) Unknown</p> <p>42. Fuel Type-1</p> <p style="text-align: right;"><u>01</u></p> <p>43. Fuel Type-2</p> <p style="text-align: right;"><u>00</u> <u>00</u></p> <p><i>Single Fuel Type</i></p> <p>(00) No fuel tank (01) Gasoline (02) Diesel (03) CNG (Compressed Natural Gas) (04) LPG (Liquid Petroleum Gas) also known as Propane (05) LNG (Liquid Natural Gas) (06) Methanol (M100 or M85) (07) Ethanol (E100 or E85) (08) Other (Hydrogen or others) (specify): _____</p> <p>_____ _____</p> <p><i>Electric Powered or Electric/Solar Powered Vehicles</i></p> <p>(10) Lead Acid Battery (11) Nickel-Iron Battery (12) Nickel-Cadmium Battery (13) Sodium Metal Chloride Battery (14) Sodium Sulfur Battery (18) Other (Specify): _____</p> <p>(98) Other Hybrid (specify): _____ _____</p> <p>(99) Unknown fuel type</p>	<p>44. Is This Vehicle Equipped With More Than Two Fuel Tanks?</p> <p>(0) No (one or two tanks only)</p> <p><i>Yes - More Than Two Tanks</i></p> <p>(1) Yes -- <u>no damage</u> to any tank or filler cap and <u>no fuel system leakage</u></p> <p>(2) Yes -- <u>no damage</u> to any tank or filler cap but <u>there is fuel system leakage</u> (specify leakage location): _____</p> <p>(3) Yes -- <u>damage</u> to an additional tank or filler cap and <u>there is fuel system leakage</u> (specify the following): Type of tank _____ Tank location _____ Filler cap location _____ Tank damage _____ Location of leakage _____ Type of fuel _____</p> <p>(9) Unknown if more than two tanks</p> <p style="text-align: center;">COMMENTS</p> <p>_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____</p>
---	--

***** STOP: IF THE CDS APPLICABLE VEHICLE WAS NOT TOWED AND WAS NOT AN AOPS *****
(I.E., GV09=0 OR 9 AND GV36=0), DO NOT COMPLETE THE INTERIOR VEHICLE FORM.



U.S. Department of Transportation
National Highway Traffic Safety
Administration

BEST AVAILABLE

INTERIOR VEHICLE FORM

NATIONAL ACCIDENT SAMPLING SYSTEM
CRASHWORTHINESS DATA SYSTEM

1. Primary Sampling Unit Number

10

2. Case Number - Stratum

9404

3. Vehicle Number

01

INTEGRITY

4. Passenger Compartment Integrity
(00) No integrity loss

98

Yes, Integrity Was Lost Through

- (01) Windshield
(02) Door (side)
(03) Door/hatch (back door)
(04) Roof
(05) Roof glass
(06) Side window
(07) Rear window (backlight)
(08) Roof and roof glass
(09) Windshield and door (side)
(10) Windshield and roof
(11) Side and rear window (side window and backlight)
(12) Windshield and side window
(13) Door and side window
(98) Other combination of above (specify):
All windows knocked out
(99) Unknown

Door, Tailgate or Hatch Opening

5. LF 3 6. RF 3 7. LR 0 8. RR 0 9. TG/H 3

- (0) No door/gate/hatch
(1) Door/gate/hatch remained closed and operational
(2) Door/gate/hatch came open during collision
(3) Door/gate/hatch jammed shut
(8) Other (specify):

(9) Unknown

Damage/Failure Associated with Door, Tailgate or Hatch Opening in Collision. If IV05-IV09 ≠ 2, Then code 0

10. LF 0 11. RF 0 12. LR 0 13. RR 0 14. TG/H 0

- (0) No door/gate/hatch or door not opened

Door, Tailgate or Hatch Came Open During Collision

- (1) Door operational (no damage)
(2) Latch/striker failure due to damage
(3) Hinge failure due to damage
(4) Door structure failure due to damage
(5) Door support (i.e., pillar, sill, roof side rail, etc.) failure due to damage
(6) Latch/striker and hinge failure due to damage
(8) Other failure (specify):

(9) Unknown

GLAZING

Glazing Damage from Impact Forces

15. WS 3 16. LF 6 17. RF 6 18. LR 6 19. RR 6
20. BL 6 21. Roof 6 22. Other 0

- (0) No glazing damage from impact forces
(2) Glazing in place and cracked from impact forces
(3) Glazing in place and holed from impact forces
(4) Glazing out-of-place (cracked or not) and not holed from impact forces
(5) Glazing out-of-place and holed from impact forces
(6) Glazing disintegrated from impact forces
(7) Glazing removed prior to accident
(8) No glazing
(9) Unknown if damaged

Glazing Damage from Occupant Contact

23. WS 0 24. LF 0 25. RF 0 26. LR 0 27. RR 0
28. BL 0 29. Roof 0 30. Other 0

- (0) No occupant contact to glazing or no glazing
(1) Glazing contacted by occupant but no glazing damage
(2) Glazing in place and cracked by occupant contact
(3) Glazing in place and holed by occupant contact
(4) Glazing out-of-place (cracked or not) by occupant contact and not holed by occupant contact
(5) Glazing out-of-place by occupant contact and holed by occupant contact
(6) Glazing disintegrated by occupant contact
(9) Unknown if contacted by occupant

If No Glazing Damage And No Occupant Contact or No Glazing, Then Code IV31 Through IV46 As 0

Type of Window/Windshield Glazing

31. WS 1 32. LF 2 33. RF 2 34. LR 2 35. RR 2
36. BL 2 37. Roof 3 38. Other 0

- (0) No glazing contact and no damage, or no glazing
(1) AS-1 - Laminated
(2) AS-2 - Tempered
(3) AS-3 - Tempered-tinted
(4) AS-14 - Glass/Plastic
(8) Other (specify):

(9) Unknown

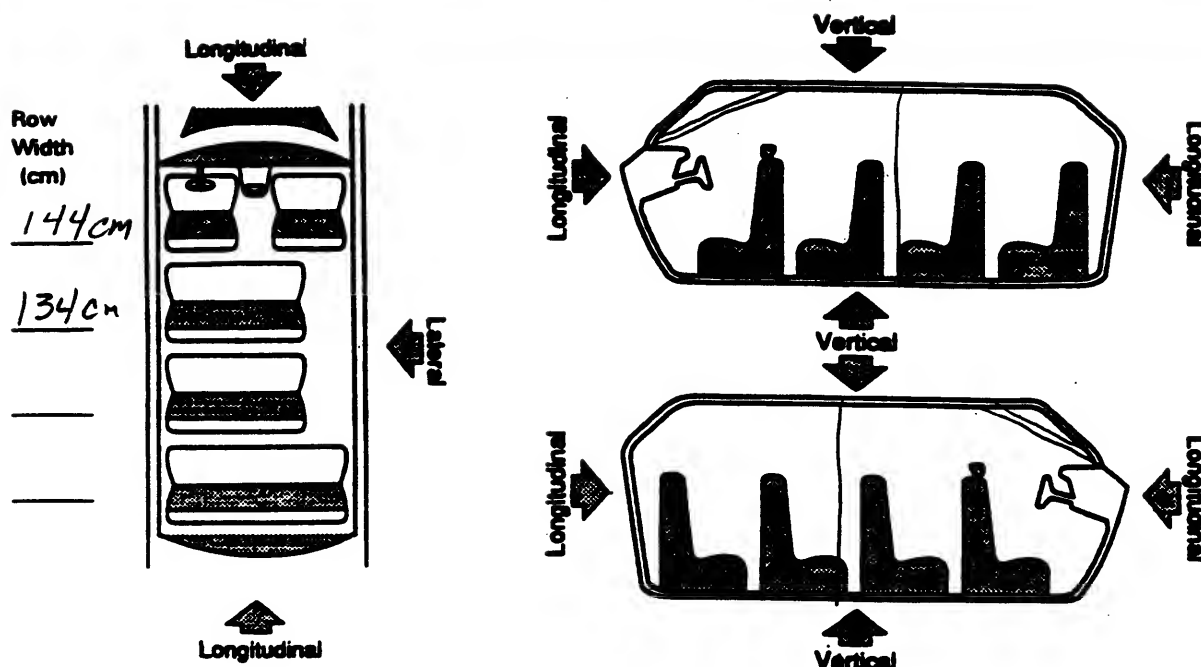
Window Precrash Glazing Status

39. WS 1 40. LF 2 41. RF 2 42. LR 1 43. RR 1
44. BL 1 45. Roof 9 46. Other 0

- (0) No glazing contact and no damage, or no glazing
(1) Fixed
(2) Closed
(3) Partially opened
(4) Fully opened
(9) Unknown

INTRUSION WORKSHEET

Note: Sketch intruded areas



LOCATION OF INTRUSION	INTRUDED COMPONENT	(All Measurements Are in Centimeters)			INTRUSION	DOMINANT CRUSH DIRECTION	
		COMPARISON VALUE	INTRUDED VALUE	=			
11	A-Pillar	81cm	67cm	=	14cm	VERT	2
11	SIDE RAIL	81cm	68cm	=	13cm	VERT	3
13	" "	81	75	=	6cm	VERT	
11	FRONT HEADER	83cm	70cm	=	13cm	VERT	4
11	ROOF	87cm	67cm	=	20cm	VERT	1
21	SIDE RAIL	56cm	52cm	=	4cm	LAT	10
23	" "	56cm	52cm	=	4cm	LAT	
13	B-Pillar	56cm	50cm	=	6cm	LAT	7
23	C-Pillar	57cm	52cm	=	5cm	LAT	9
11	WINDOW DOOR FRAME	58cm	46cm	=	8cm	VERT	6
11	SIDE RAIL	55cm	50cm	=	5cm	LAT	
13	" "	55cm	43cm	=	12cm	LAT	5
21	ROOF	78cm	73cm	=	5cm	VERT	8
11	A-Pillar	56cm	50cm	=	6cm	LAT	
		-		=			

OCCUPANT AREA INTRUSION

Note: If no intrusions, leave variables IV47-IV86 blank.

	Location of Intrusion	Intruding Component	Magnitude of Intrusion	Dominant Crush Direction
1st	47. <u>11</u>	48. <u>12</u>	49. <u>3</u>	50. <u>1</u>
2nd	51. <u>11</u>	52. <u>06</u>	53. <u>2</u>	54. <u>1</u>
3rd	55. <u>11</u>	56. <u>13</u>	57. <u>2</u>	58. <u>1</u>
4th	59. <u>11</u>	60. <u>15</u>	61. <u>2</u>	62. <u>1</u>
5th	63. <u>13</u>	64. <u>13</u>	65. <u>2</u>	66. <u>3</u>
6th	67. <u>11</u>	68. <u>16</u>	69. <u>2</u>	70. <u>1</u>
7th	71. <u>13</u>	72. <u>07</u>	73. <u>1</u>	74. <u>3</u>
8th	75. <u>21</u>	76. <u>12</u>	77. <u>1</u>	78. <u>1</u>
9th	79. <u>23</u>	80. <u>08</u>	81. <u>1</u>	82. <u>3</u>
10th	83. <u>21</u>	84. <u>13</u>	85. <u>1</u>	86. <u>3</u>

LOCATION OF INTRUSION

Front Seat
 (11) Left
 (12) Middle
 (13) Right

Second Seat
 (21) Left
 (22) Middle
 (23) Right

Third Seat
 (31) Left
 (32) Middle
 (33) Right

Fourth Seat
 (41) Left
 (42) Middle
 (43) Right

(97) Catastrophic
 (98) Other enclosed area (specify)

(99) Unknown

INTRUDING COMPONENT

Interior Components

- (01) Steering assembly
- (02) Instrument panel left
- (03) Instrument panel center
- (04) Instrument panel right
- (05) Toe pan
- (06) A (A1/A2)-pillar
- (07) B-pillar
- (08) C-pillar
- (09) D-pillar
- (10) Door panel (side)
- (12) Roof (or convertible top)
- (13) Roof side rail
- (14) Windshield
- (15) Windshield header
- (16) Window frame
- (17) Floor pan (includes sill)
- (18) Backlight header
- (19) Front seat back
- (20) Second seat back
- (21) Third seat back
- (22) Fourth seat back
- (23) Fifth seat back
- (24) Seat cushion
- (25) Back door/panel (e.g., tailgate)
- (26) Other interior component (specify):

- (27) Side panel - forward of the A (A2)-pillar
- (28) Side panel - rear of the A (A2)-pillar

Exterior Components

- (30) Hood
- (31) Outside surface of this vehicle (specify):
- (32) Other exterior object in the environment (specify):
- (33) Unknown exterior object
- (97) Catastrophic
- (98) Intrusion of unlisted component(s) (specify):
- (99) Unknown

MAGNITUDE OF INTRUSION

- (1) ≥ 3 centimeters but < 8 centimeters
- (2) ≥ 8 centimeters but < 15 centimeters
- (3) ≥ 15 centimeters but < 30 centimeters
- (4) ≥ 30 centimeters but < 46 centimeters
- (5) ≥ 46 centimeters but < 61 centimeters
- (6) ≥ 61 centimeters
- (7) Catastrophic
- (9) Unknown

DOMINANT CRUSH DIRECTION

- (1) Vertical
- (2) Longitudinal
- (3) Lateral
- (7) Catastrophic
- (9) Unknown

STEERING RIM SPOKE DEFORMATION

(All Measurements Are in Centimeters)

COMPARISON VALUE	—	DAMAGE VALUE	=	DEFORMATION
------------------	---	--------------	---	-------------

	—		=	
	—		=	
	—		=	
	—		=	

STEERING COLUMN

87. Steering Column Type 2

- (1) Fixed column
 (2) Tilt column
 (3) Telescoping column
 (4) Tilt and telescoping column
 (8) Other column type (specify): _____

(9) Unknown

88. Blank X X

(This variable is left blank so that numbering consistency can be maintained with the 1988-94 CDS.

89. Blank X X X

(This variable is left blank so that numbering consistency can be maintained with the 1988-94 CDS.

90. Blank X X X

(This variable is left blank so that numbering consistency can be maintained with the 1988-94 CDS.

91. Blank X X X

(This variable is left blank so that numbering consistency can be maintained with the 1988-94 CDS.

92. Steering Rim/Spoke Deformation 00

- Code actual measured deformation to the nearest centimeter
 (00) No steering rim deformation
 (01-14) Actual measured value in centimeters
 (15) 15 centimeters or more
 (98) Observed deformation cannot be measured
 (99) Unknown

93. Location of Steering Rim/Spoke Deformation 0 0

(00) No steering rim deformation

Quarter Sections

- (01) Section A
 (02) Section B
 (03) Section C
 (04) Section D



Half Sections

- (05) Upper half of rim/spoke
 (06) Lower half of rim/spoke
 (07) Left half of rim/spoke
 (08) Right half of rim/spoke



- (09) Complete steering wheel collapse
 (10) Undetermined location
 (99) Unknown

INSTRUMENT PANEL

94. Odometer Reading 0 2 7,000

- _____ kilometers—Code to the nearest 1,000 kilometers
 (000) No odometer
 (001) Less than 1,500 kilometers
 (500) 499,500 kilometers or more
 (999) Unknown

16 959 miles $\times 1.6093 =$ 27292 kilometers

Source: ODOMETER

95. Instrument Panel Damage from Occupant Contact? 9

- (0) No
 (1) Yes
 (9) Unknown

96. Knee Bolsters Deformed from Occupant Contact? 8

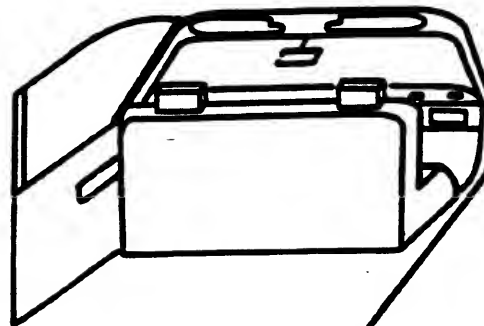
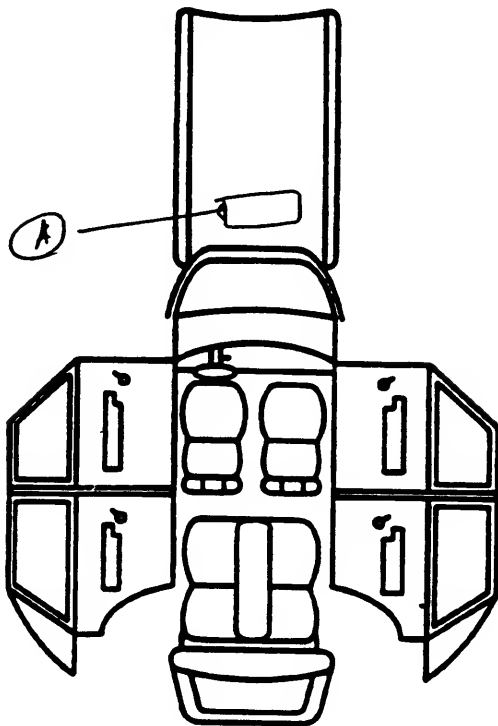
- (0) No
 (1) Yes
 (8) Not present
 (9) Unknown

97. Did Glove Compartment Door Open During Collision(s)? 0

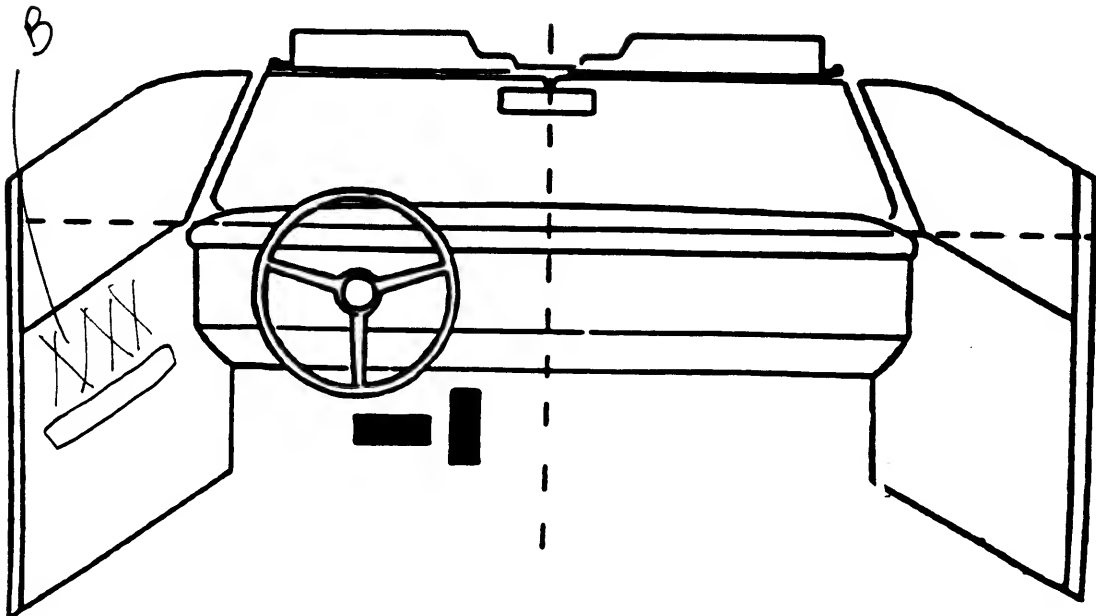
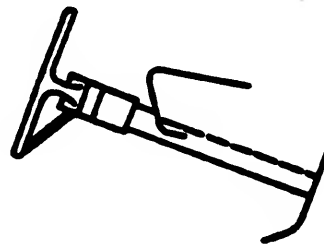
- (0) No
 (1) Yes
 (8) Not present
 (9) Unknown

VEHICLE INTERIOR SKETCHES

Interior open to Enviromental conditions
 Note area of ejection/entrapment



*MUD + GARBAGE
 throughout interior.*



Sketch windshield contact(s) and the damaged area(s) on the instrument panel outline (e.g., radio, glove compartment, damage to instrument panel structure).
 Cross hatch contact points, draw spider webs or use other annotation as may be appropriate.
 Annotate the contacted area with a letter (begin with A) and list on the Points of Occupant Contact page.

POINTS OF OCCUPANT CONTACT

Contact	Interior Component Contacted	Occupant No. If Known	Body Region If Known	Supporting Physical Evidence	Confidence Level of Contact Point
A	54	1	HEAD	ROUNDED indentation	3
B	20	1	upper torso	pushed outward/indented	2
C					
D					
E					
F					
G					
H					
I					
J					
K					
L					
M					
N					

CODES FOR INTERIOR COMPONENTS

FRONT

- (01) Windshield
- (02) Mirror
- (03) Sunvisor
- (04) Steering wheel rim
- (05) Steering wheel hub/spoke
- (06) Steering wheel (combination of codes 04 and 05)
- (07) Steering column, transmission selector lever, other attachment
- (08) Add on equipment (e.g., CB, tape deck, air conditioner)
- (09) Left instrument panel and below
- (10) Center instrument panel and below
- (11) Right instrument panel and below
- (12) Glove compartment door
- (13) Knee bolster
- (14) Windshield including one or more of the following: front header, A (A1/A2)-pillar, instrument panel, mirror, or steering assembly (driver side only)
- (15) Windshield including one or more of the following: front header, A (A1/A2)-pillar, instrument panel, or mirror (passenger side only)
- (16) Driver side air bag compartment cover
- (17) Passenger side air bag compartment cover
- (18) Windshield reinforced by exterior object (specify): _____
- (19) Other front object (specify): _____

LEFT SIDE

- (20) Left side interior surface, excluding hardware or armrests
- (21) Left side hardware or armrest
- (22) Left A (A1/A2)-pillar

- (23) Left B-pillar
- (24) Other left pillar (specify): _____
- (25) Left side window glass or frame
- (26) Left side window glass including one or more of the following: frame, window sill, A (A1/A2)-pillar, B-pillar, or roof side rail.
- (27) Other left side object (specify): _____
- (28) Left side window sill

RIGHT SIDE

- (30) Right side interior surface, excluding hardware or armrests
- (31) Right side hardware or armrest
- (32) Right A (A1/A2)-pillar
- (33) Right B-pillar
- (34) Other right pillar (specify): _____
- (35) Right side window glass or frame
- (36) Right side window glass including one or more of the following: frame, window sill, A (A1/A2)-pillar, B pillar, or roof side rail.
- (37) Other right side object (specify): _____
- (38) Right side window sill

INTERIOR

- (40) Seat, back support
- (41) Belt restraint webbing/buckle
- (42) Belt restraint B-pillar attachment point
- (43) Other restraint system component (specify): _____
- (44) Head restraint system
- (45) Air bag (use codes "16" and "17" for injuries sustained from air bag compartment covers)

(46) Other occupants (specify): _____

(47) Interior loose objects

(48) Child safety seat (specify): _____

(49) Other interior object (specify): _____

ROOF

- (50) Front header
- (51) Rear header
- (52) Roof left side rail
- (53) Roof right side rail
- (54) Roof or convertible top

FLOOR

- (56) Floor (including toe pan)
- (57) Floor or console mounted transmission lever, including console
- (58) Parking brake handle
- (59) Foot controls including parking brake

REAR

- (60) Backlight (rear window)
- (61) Backlight storage rack, door, etc.
- (62) Other rear object (specify): _____

CONFIDENCE LEVEL OF CONTACT POINT

- (1) Certain
- (2) Probable
- (3) Possible
- (9) Unknown

AUTOMATIC RESTRAINTS

NOTES: Encode the data for each applicable front seat position. The attribute for the variables may be found below. Restraint systems should be assessed during the vehicle inspection then coded on the Occupant Assessment Form.

AIR BAGS

		Left	Right
F I R S T	Availability/Function	0	0
	Deployment	0	0
	Failure	0	0

Air Bag System Availability/Function

- (0) Not equipped/not available
(1) Air bag

Non-functional

- (2) Air bag disconnected (specify): _____

- (3) Air bag not reinstalled
(9) Unknown

Air Bag System Deployment

- (0) Not equipped/not available
(1) Air bag deployed during accident (as a result of impact)
(2) Air bag deployed inadvertently just prior to accident
(3) Air bag deployed, accident sequence undetermined
(4) Nondeployed
(5) Unknown if deployed
(6) Air bag deployed as a result of a noncollision event during accident sequence (e.g., fire, explosion, electrical)
(9) Unknown

Are There Indications of Air Bag System Failure?

- (0) Not equipped/not available
(1) No
(2) Yes (specify): _____
(9) Unknown

AUTOMATIC BELTS

		Left	Right
F I R S T	Availability/Function	1	1
	Use	1	2
	Type	2	2
	Proper Use	9	0
	Failure Modes	1	0

Automatic (Passive) Belt System Availability/Function

- (0) Not equipped/not available
(1) 2 point automatic belts
(2) 3 point automatic belts
(3) Automatic belts - type unknown

Non-functional

- (4) Automatic belts destroyed or rendered inoperative
(9) Unknown

Automatic (Passive) Belt System Use

- (0) Not equipped/not available/destroyed or rendered inoperative
(1) Automatic belt in use
(2) Automatic belt not in use (manually disconnected, motorized track inoperative)
(3) Automatic belt use unknown
(9) Unknown

Automatic (Passive) Belt System Type

- (0) Not equipped/not available
(1) Non-motorized system
(2) Motorized system
(9) Unknown

Proper Use of Automatic (Passive) Belt System

- (0) Not equipped/not available/not used
(1) Automatic belt used properly
(2) Automatic belt used properly with child safety seat

Automatic Belt Used Improperly

- (3) Automatic shoulder belt worn under arm
(4) Automatic shoulder belt worn behind back
(5) Automatic belt worn around more than one person
(6) Lap portion of automatic belt worn on abdomen
(7) Automatic lap and shoulder belt or automatic shoulder belt used improperly with child safety seat (specify): _____
(8) Other improper use of automatic belt system (specify): _____
(9) Unknown

Automatic (Passive) Belt Failure Modes During Accident

- (0) Not equipped/not available/not in use
(1) No automatic belt failure(s)
(2) Torn webbing (stretched webbing not included)
(3) Broken buckle or latchplate
(4) Upper anchorage separated
(5) Other anchorage separated (specify): _____
(6) Broken retractor
(7) Combination of above (specify): _____
(8) Other automatic belt failure (specify): _____
(9) Unknown

MANUAL RESTRAINTS

NOTES: Encode the applicable data for each seat position in the vehicle. The attribute for the variable may be found below. Restraint systems should be assessed during the vehicle inspection then coded on the Occupant Assessment Form.

If a Child safety seat is present, encode the data on the back of this page.

If the vehicle has automatic restraints available, encode the appropriate data on the back of the previous page.

		Left	Center	Right
F I R S T	Availability	3	0	3
	Evidence of usage	00		00
	Used in this crash?	00		00
	Proper Use	0		0
	Failure Modes	0		0
S E C O N D	Availability	3		3
	Evidence of usage	00		00
	Used in this crash?	00		00
	Proper Use	0		0
	Failure Modes	0		0
O T H E R	Availability			
	Evidence of usage			
	Used in this crash?			
	Proper Use			
	Failure Modes			

Manual (Active) Belt System Availability

- (0) None available
- (1) Belt removed/destroyed
- (2) Shoulder belt
- (3) Lap belt
- (4) Lap and shoulder belt
- (5) Belt available - type unknown

Integral Belt Partially Destroyed

- (6) Shoulder belt (lap belt destroyed/removed)
- (7) Lap belt (shoulder belt destroyed/removed)

(8) Other belt (specify): _____

(9) Unknown

Manual (Active) Belt System Use

- (00) None used, not available, or belt removed/destroyed
- (01) Inoperable (specify): _____

- (02) Shoulder belt
- (03) Lap belt
- (04) Lap and shoulder belt
- (05) Belt used - type unknown
- (08) Other belt used (specify): _____

(12) Shoulder belt used with child safety seat

(13) Lap belt used with child safety seat

(14) Lap and shoulder belt used with child safety seat

(15) Belt used with child safety seat - type unknown

(18) Other belt used with child safety seat (specify): _____

(99) Unknown if belt used

Proper Use of Manual (Active) Belts

- (0) None used or not available
- (1) Belt used properly
- (2) Belt used properly with child safety seat

Belt Used Improperly

- (3) Shoulder belt worn under arm
- (4) Shoulder belt worn behind back or seat
- (5) Belt worn around more than one person
- (6) Lap belt worn on abdomen
- (7) Lap belt or lap and shoulder belt used improperly with child safety seat (specify): _____

(8) Other improper use of manual belt system (specify): _____

(9) Unknown

Manual (Active) Belt Failure Modes During Accident

- (0) No manual belt used or not available
- (1) No manual belt failure(s)
- (2) Torn webbing (stretched webbing not included)
- (3) Broken buckle or latchplate
- (4) Upper anchorage separated
- (5) Other anchorage separated (specify): _____

(6) Broken retractor

(7) Combination of above (specify): _____

(8) Other manual belt failure (specify): _____

(9) Unknown

CHILD SAFETY SEAT FIELD ASSESSMENT

When a child safety seat is present enter the occupant's number in the first row and complete the column below the occupant's number using the codes listed below. Complete a column for each child safety seat present.

Occupant Number						
1. Type of Child Safety Seat						
2. Child Safety Seat Orientation						
3. Child Safety Seat Harness Usage						
4. Child Safety Seat Shield Usage						
5. Child Safety Seat Tether Usage						
6. Child Safety Seat Make/Model	Specify Below for Each Child Safety Seat					

1. Type of Child Safety Seat

- (0) No child safety seat
 (1) Infant seat
 (2) Toddler seat
 (3) Convertible seat
 (4) Booster seat
 (7) Other type child safety seat (specify):

 (8) Unknown child safety seat type
 (9) Unknown if child safety seat used

2. Child Safety Seat Orientation

- (00) No child safety seat
 Designed for Rear Facing for This Age/Weight
 (01) Rear facing
 (02) Forward facing
 (08) Other orientation (specify):

 (09) Unknown orientation

Designed for Forward Facing for This Age/Weight

- (11) Rear facing
 (12) Forward facing
 (18) Other orientation (specify):

(19) Unknown orientation

Unknown Design or Orientation For This Age/Weight, or Unknown Age/Weight

- (21) Rear facing
 (22) Forward facing
 (28) Other orientation (specify):

(29) Unknown orientation

(99) Unknown if child safety seat used

3. Child Safety Seat Harness Usage

4. Child Safety Seat Shield Usage

5. Child Safety Seat Tether Usage

Note: Options Below Are Used for Variables 3-5.

- (00) No child safety seat

Not Designed with Harness/Shield/Tether

- (01) After market harness/shield/tether added, not used
 (02) After market harness/shield/tether used
 (03) Child safety seat used, but no after market harness/shield/tether added
 (09) Unknown if harness/shield/tether added or used

Designed With Harness/Shield/Tether

- (11) Harness/shield/tether not used
 (12) Harness/shield/tether used
 (19) Unknown if harness/shield/tether used

Unknown If Designed With Harness/Shield/Tether

- (21) Harness/shield/tether not used
 (22) Harness/shield/tether used
 (29) Unknown if harness/shield/tether used

(99) Unknown if child safety seat used

6. Child Safety Seat Make/Model

(Specify make/model and occupant number)

HEAD RESTRAINTS/SEAT EVALUATION

NOTES: Encode the applicable data for each seat position in the vehicle. The attribute for these variables may be found at the bottom of the page. Head restraint type/damage and seat type/performance should be assessed during the vehicle inspection then coded on the Occupant Assessment Form.

		Left	Center	Right
F I R S T	Head Restraint Type/Damage	3		3
	Seat Type	02		02
	Seat Performance	1		1
	Seat Orientation	1		1
S E C O N D	Head Restraint Type/Damage	0		0
	Seat Type	05		05
	Seat Performance	9		9
	Seat Orientation	1		1
T H I R D	Head Restraint Type/Damage			
	Seat Type			
	Seat Performance			
	Seat Orientation			
O T H E R	Head Restraint Type/Damage			
	Seat Type			
	Seat Performance			
	Seat Orientation			

Head Restraint Type/Damage by Occupant at This Occupant Position

- (0) No head restraints
- (1) Integral — no damage
- (2) Integral — damaged during accident
- (3) Adjustable — no damage
- (4) Adjustable — damaged during accident
- (5) Add-on — no damage
- (6) Add-on — damaged during accident
- (8) Other Specify: _____

(9) Unknown _____

Seat Type (this Occupant Position)

- (00) Occupant not seated or no seat
- (01) Bucket
- (02) Bucket with folding back
- (03) Bench
- (04) Bench with separate back cushions
- (05) Bench with folding back(s)
- (06) Split bench with separate back cushions
- (07) Split bench with folding back(s)
- (08) Pedestal (i.e., column supported)
- (09) Other seat type (specify): _____

(10) Box mounted seat (i.e., van type) _____

(99) Unknown _____

Seat Performance (this Occupant Position)

- (0) Occupant not seated or no seat
- (1) No seat performance failure(s)
- (2) Seat adjusters failed
- (3) Seat back folding locks or "seat back" failed specify: _____
- (4) Seat tracks/anchors failed
- (5) Deformed by impact of occupant
- (6) Deformed by passenger compartment intrusion (specify): _____

(7) Combination of above (specify): _____

(8) Other (specify): _____

(9) Unknown _____

Seat Orientation (this Occupant Position)

- (0) Occupant not seated or no seat
- (1) Forward facing seat
- (2) Rear facing seat
- (3) Side facing seat (inward)
- (4) Side facing seat (outward)
- (8) Other (specify): _____

(9) Unknown _____

DESCRIBE ANY INDICATION OF ABNORMAL OCCUPANT POSTURE (I.E., UNUSUAL OCCUPANT CONTACT PATTERN)

EJECTION ENTRAPMENT DATA

Complete the following if the researcher has any indication that an occupant was either ejected from or entrapped in the vehicle. Code the appropriate data on the Occupant Assessment Form.

EJECTION No [] Yes [X]

Describe indications of ejection and body parts involved in partial ejection(s):

Decapitated, HEAD on floor Body completely
ejected probably through sun roof

Occupant Number	1					
Ejection	1					
(Note on Vehicle Interior Sketch) Ejection Area	7					
Ejection Medium	4					
Medium Status	9					

Ejection

- (1) Complete ejection
(2) Partial ejection
(3) Ejection, Unknown degree
(9) Unknown

Ejection Area

- (1) Windshield
(2) Left front
(3) Right front
(4) Left rear
(5) Right rear
(6) Rear

(7) Roof

- (8) Other area (e.g., back of pickup, etc.) (specify):

(9) Unknown

Ejection Medium

- (1) Door/hatch/tailgate
(2) Nonfixed roof structure
(3) Fixed glazing
(4) Nonfixed glazing (specify):

SUN ROOF

(5) Integral structure

- (8) Other medium (specify):

(9) Unknown

Medium Status (Immediately Prior to Impact)

- (1) Open
(2) Closed
(3) Integral structure
(9) Unknown

ENTRAPMENT

No [X] Yes []

Describe entrapment mechanism:

Component(s):

(Note in vehicle interior diagram)

Appendix D:

NASS CDS Occupant Assessment Form



U.S. Department of Transportation
National Highway Traffic Safety
Administration

OCCUPANT ASSESSMENT FORM

BEST AVAILABLE

Form Approved
O.M.B. No. 2127-0021

NATIONAL ACCIDENT SAMPLING SYSTEM
CRASHWORTHINESS DATA SYSTEM

1. Primary Sampling Unit Number 10

2. Case Number - Stratum 9404

3. Vehicle Number 01

4. Occupant Number 01

OCCUPANT'S CHARACTERISTICS

5. Occupant's Age 21
Code actual age at time of accident.
(00) Less than one year old (specify by month):

(97) 97 years and older

(99) Unknown

6. Occupant's Sex 2

(1) Male

(2) Female

(9) Unknown

7. Occupant's Height 999
Code actual height to the nearest
centimeter.
(999) Unknown

_____ inches X 2.54 = _____ centimeters

8. Occupant's Weight 999
Code actual weight to the nearest
kilogram.
(999) Unknown

_____ pounds X .4536 = _____ kilograms

9. Occupant's Role 1

(1) Driver

(2) Passenger

(9) Unknown

OCCUPANT'S SEATING

10. Occupant's Seat Position 11

Front Seat

(11) Left side

(12) Middle

(13) Right side

(14) Other (specify): _____

(15) On or in the lap of another occupant

Second Seat

(21) Left side

(22) Middle

(23) Right side

(24) Other (specify): _____

(25) On or in the lap of another occupant

Third Seat

(31) Left side

(32) Middle

(33) Right side

(34) Other (specify): _____

(35) On or in the lap of another occupant

Fourth Seat

(41) Left side

(42) Middle

(43) Right side

(44) Other (specify): _____

(45) On or in the lap of another occupant

(97) In or on unenclosed area

(98) Other seat (specify): _____

(99) Unknown

11. Occupant's Posture 9

(0) Normal posture

Abnormal posture

(1) Kneeling or standing on seat

(2) Lying on or across seat

(3) Kneeling, standing or sitting in front of seat

(4) Sitting sideways or turned to talk with another occupant or to look out a rear window

(5) Sitting on a console

(6) Lying back in a reclined seat position

(7) Bracing with feet or hands on a surface in front of seat

(8) Other abnormal posture (specify): _____

(9) Unknown

EJECTION/ENTRAPMENT

12. Ejection 1

- (0) No ejection
- (1) Complete ejection
- (2) Partial ejection
- (3) Ejection, unknown degree
- (9) Unknown

13. Ejection Area 2

- (0) No ejection
- (1) Windshield
- (2) Left front
- (3) Right front
- (4) Left rear
- (5) Right rear
- (6) Rear
- (7) Roof
- (8) Other area (e.g., back of pickup, etc.)
(specify): _____
- (9) Unknown

14. Ejection Medium 4

- (0) No ejection
- (1) Door/hatch/tailgate
- (2) Nonfixed roof structure
- (3) Fixed glazing
- (4) Nonfixed glazing (specify): _____
- (5) Integral structure
- (8) Other medium (specify): _____
- (9) Unknown

15. Medium Status (Immediately Prior To Impact) 2

- (0) No ejection
- (1) Open
- (2) Closed
- (3) Integral structure
- (9) Unknown

16. Entrapment Ø

(NOTE: Entrapped means that part of the person was in the vehicle and mechanically restrained; jammed doors and immobilizing injuries by themselves are not sufficient to constitute entrapment.)

- (0) Not entrapped
- (1) Entrapped
- (9) Unknown

RESTRAINT SYSTEM EVALUATION

17. Manual (Active) Belt System Availability 3

- (0) None available
- (1) Belt removed/destroyed
- (2) Shoulder belt
- (3) Lap belt
- (4) Lap and shoulder belt
- (5) Belt available—type unknown

Integral Belt Partially Destroyed

- (6) Shoulder belt (lap belt destroyed/removed)
- (7) Lap belt (shoulder belt destroyed/removed)

(8) Other belt (specify): _____

(9) Unknown

18. Manual (Active) Belt System Use Φ Φ

- (00) None used, not available, or belt removed/destroyed
- (01) Inoperative (specify): _____

- (02) Shoulder belt
- (03) Lap belt
- (04) Lap and shoulder belt
- (05) Belt used—type unknown
- (08) Other belt used (specify): _____

- (12) Shoulder belt used with child safety seat
- (13) Lap belt used with child safety seat
- (14) Lap and shoulder belt used with child safety seat
- (15) Belt used with child safety seat—type unknown
- (18) Other belt used with child safety seat (specify): _____
- (99) Unknown if belt used

19. Proper Use of Manual (Active) Belts Φ

- (0) None used or not available
- (1) Belt used properly
- (2) Belt used properly with child safety seat

Belt Used Improperly

- (3) Shoulder belt worn under arm
- (4) Shoulder belt worn behind back or seat
- (5) Belt worn around more than one person
- (6) Lap belt worn on abdomen
- (7) Lap belt or lap and shoulder belt used improperly with child safety seat (specify): _____

(8) Other improper use of manual belt system (specify): _____

(9) Unknown

20. Manual (Active) Belt Failure Modes During Accident Φ

- (0) No manual belt used
- (1) No manual belt failure(s)
- (2) Torn webbing (stretched webbing not included)
- (3) Broken buckle or latchplate
- (4) Upper anchorage separated
- (5) Other anchorage separated (specify): _____

- (6) Broken retractor
- (7) Combination of above (specify): _____

(8) Other manual belt failure (specify): _____

(9) Unknown

21. Air Bag System Availability/Function Φ

- (0) Not equipped/not available
- (1) Air bag

Non-functional

(2) Air bag disconnected (specify): _____

(3) Air bag not reinstalled

(9) Unknown

22. Air Bag System Deployment Φ

- (0) Not equipped/not available
- (1) Air bag deployed during accident (as a result of impact)
- (2) Air bag deployed inadvertently just prior to accident
- (3) Air bag deployed, accident sequence undetermined
- (4) Nondeployed
- (5) Unknown if deployed
- (6) Air bag deployed as a result of a noncollision event during accident sequence (e.g., fire, explosion, electrical)
- (9) Unknown

23. Are There Indications of Air Bag System Failure? Φ

- (0) Not equipped/not available
- (1) No
- (2) Yes (specify): _____

(9) Unknown

Note: See Variables 44 through 48 (Page 5) for information on Automatic Belts

24. Police Reported Restraint Use 4

- (0) None used
- (1) Police did not indicate restraint use
- (2) Shoulder belt
- (3) Lap belt
- (4) Lap and shoulder belt
- (5) Belt used, type not specified
- (6) Child safety seat
- (7) Other or automatic restraint (specify): _____

(8) Restrained, type unknown

(9) Police indicated "unknown"

HEAD RESTRAINT AND SEAT EVALUATION

25. Head Restraint Type/Damage by Occupant
at This Occupant Position 3

- (0) No head restraints
- (1) Integral—no damage
- (2) Integral—damaged during accident
- (3) Adjustable—no damage
- (4) Adjustable—damaged during accident
- (5) Add-on—no damage
- (6) Add-on—damaged during accident
- (8) Other (specify): _____
- (9) Unknown

26. Seat Type (this Occupant Position) 02

- (00) Occupant not seated or no seat
- (01) Bucket
- (02) Bucket with folding back
- (03) Bench
- (04) Bench with separate back cushions
- (05) Bench with folding back(s)
- (06) Split bench with separate back cushions
- (07) Split bench with folding back(s)
- (08) Pedestal (i.e., column supported)
- (09) Other seat type (specify): _____
- (10) Box mounted seat (i.e., van type)
- (99) Unknown

27. Seat Performance (this Occupant Position) 1

- (0) Occupant not seated or no seat
- (1) No seat performance failure(s)
- (2) Seat adjusters failed
- (3) Seat back folding locks or "seat back" failed (specify): _____
- (4) Seat track/anchors failed
- (5) Deformed by impact of occupant
- (6) Deformed by passenger compartment intrusion (specify): _____
- (7) Combination of above (specify): _____
- (8) Other (specify): _____
- (9) Unknown

CHILD SAFETY SEAT

28. Child Safety Seat Make/Model

(000) No child safety seat

Applicable codes are found in your NASS CDS
Data Collection, Coding and Editing

(950) Built-in child safety seat

(997) Other make/model (specify):

(998) Unknown make/model

(999) Unknown if child safety seat used

29. Type of Child Safety Seat

(0) No child safety seat

(1) Infant seat

(2) Toddler seat

(3) Convertible seat

(4) Booster seat

(7) Other type child safety seat (specify):

(8) Unknown child safety seat type

(9) Unknown if child safety seat used

30. Child Safety Seat Orientation

(00) No child safety seat

Designed for Rear Facing for This Age/Weight

(01) Rear facing

(02) Forward facing

(08) Other orientation (specify):

(09) Unknown orientation

Designed For Forward Facing for This Age/Weight

(11) Rear facing

(12) Forward facing

(18) Other orientation (specify):

(19) Unknown orientation

*Unknown Design or Orientation For This
Age/Weight, or Unknown Age/Weight*

(21) Rear facing

(22) Forward facing

(28) Other orientation (specify):

(29) Unknown orientation

(99) Unknown if child safety seat used

31. Child Safety Seat Harness Usage

32. Child Safety Seat Shield Usage

33. Child Safety Seat Tether Usage

Note: Options below applicable to
Variables OA31-OA33.

(00) No child safety seat

Not Designed With Harness/Shield/Tether(01) After market harness/shield/tether
added, not used

(02) After market harness/shield/tether used

(03) Child safety seat used, but no after market
harness/shield/tether added(09) Unknown if harness/shield/tether
added or used*Designed With Harness/Shield/Tether*

(11) Harness/shield/tether not used

(12) Harness/shield/tether used

(19) Unknown if harness/shield/tether used

Unknown If Designed With Harness/Shield/Tether

(21) Harness/shield/tether not used

(22) Harness/shield/tether used

(29) Unknown if harness/shield/tether used

(99) Unknown if child safety seat used

INJURY CONSEQUENCES

34. Injury Severity (Police Rating) 4

- (0) O - No injury
- (1) C - Possible injury
- (2) B - Nonincapacitating injury
- (3) A - Incapacitating injury
- (4) K - Killed
- (5) U - Injury, severity unknown
- (6) Died prior to accident
- (9) Unknown

35. Treatment - Mortality 1

- (0) No treatment
- (1) Fatal
- (2) Fatal - ruled disease (specify):

Nonfatal

- (3) Hospitalization
- (4) Transported and released
- (5) Treatment at scene - nontransported
- (6) Treatment later
- (8) Treatment - other (specify):

- (9) Unknown

36. Type Of Medical Facility (for Initial Treatment) 0

- (0) Not treated at a medical facility
- (1) Trauma center
- (2) Hospital
- (3) Medical clinic
- (4) Physician's office
- (5) Treatment later at medical facility
- (8) Other (specify):

- (9) Unknown

37. Hospital Stay 00

- (00) Not Hospitalized
- _____ Code the number of days (up through 60) that the occupant stayed in hospital.
- (61) 61 days or more
- (99) Unknown

38. Working Days Lost 62

- _____ Code the number of days (up through 60) that the occupant lost from work due to the accident
- (00) No working days lost
- (61) 61 days or more
- (62) Fatally injured
- (97) Not working prior to accident
- (99) Unknown

STOP - GO TO VARIABLE 44 ON PAGE 7**VARIABLES 39 THROUGH 43 ARE COMPLETED BY THE ZONE CENTER**39. Time to Death 01

- _____ Code number of hours from time of accident to time of death up through 24 hours. If time of death is greater than 24 hours, code number of days. (Note: 1 day = 31, 2 days = 32, ... n days = 30 + n up through 30 days = 60)
- (00) Not fatal
- (96) Fatal - ruled disease
- (99) Unknown

40. 1st Medically Reported Cause of Death 0141. 2nd Medically Reported Cause of Death 0042. 3rd Medically Reported Cause of Death 00

- _____ Code the Occupant Injury from line number(s) for the medically reported injury(s) which reportedly contributed to this occupant's death
- (00) Not fatal or no additional causes
- (96) Mode of death given but specific injuries are not linked to cause of death. (specify):

- (97) Other result (includes fatal ruled disease) (specify):

- (99) Unknown

43. Number of Recorded Injuries for This Occupant 02

- _____ Code the actual number of injuries recorded for this occupant.
- (00) No recorded injuries
- (97) Injured, details unknown
- (99) Unknown if injured

AUTOMATIC BELT SYSTEM	
<p>44. Automatic (Passive) Belt System Availability/Function <u>1</u></p> <p>(0) Not equipped/not available</p> <p>(1) 2 point automatic belts</p> <p>(2) 3 point automatic belts</p> <p>(3) Automatic belts - type unknown</p> <p><i>Non-functional</i></p> <p>(4) Automatic belts destroyed or rendered inoperative</p> <p>(9) Unknown</p>	<p>48. Automatic (Passive) Belt Failure Modes During Accident <u>1</u></p> <p>(0) Not equipped/not available/not in use</p> <p>(1) No automatic belt failure(s)</p> <p>(2) Torn webbing (stretched webbing not included)</p> <p>(3) Broken buckle or latchplate</p> <p>(4) Upper anchorage separated</p> <p>(5) Other anchorage separated (specify):</p> <p>(6) Broken retractor</p> <p>(7) Combination of above (specify):</p> <p>(8) Other automatic belt failure (specify):</p> <p>(9) Unknown</p>
<p>45. Automatic (Passive) Belt System Use <u>1</u></p> <p>(0) Not equipped/not available/destroyed or rendered inoperative</p> <p>(1) Automatic belt in use</p> <p>(2) Automatic belt not in use (manually disconnected, motorized track inoperative) (specify):</p> <p>(3) Automatic belt use unknown</p> <p>(9) Unknown</p>	<p>49. Seat Orientation (this Occupant Position) <u>1</u></p> <p>(0) Occupant not seated or no seat</p> <p>(1) Forward facing seat</p> <p>(2) Rear facing seat</p> <p>(3) Side facing seat (inward)</p> <p>(4) Side facing seat (outward)</p> <p>(8) Other (specify):</p> <p>(9) Unknown</p>
<p>46. Automatic (Passive) Belt System Type <u>2</u></p> <p>(0) Not equipped/not available</p> <p>(1) Non-motorized system</p> <p>(2) Motorized system</p> <p>(9) Unknown</p>	<p>Check the Primary Source Used In Determining Belt Use.</p> <p>[] Not equipped/not available/destroyed or rendered inoperative</p> <p>[] Vehicle inspection</p> <p>[] Official injury data</p> <p>[] Driver/occupant interview</p> <p>[] Other (specify):</p> <p>[] Unknown if belt used</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>47. Proper Use of Automatic (Passive) Belt System <u>1</u></p> <p>(0) Not equipped/not available/not used</p> <p>(1) Automatic belt used properly</p> <p>(2) Automatic belt used properly with child safety seat</p> <p><i>Automatic Belt Used Improperly</i></p> <p>(3) Automatic shoulder belt worn under arm</p> <p>(4) Automatic shoulder belt worn behind back</p> <p>(5) Automatic belt worn around more than one person</p> <p>(6) Lap portion of automatic belt worn on abdomen</p> <p>(7) Automatic lap and shoulder belt or automatic shoulder belt used improperly with child safety seat (specify):</p> <p>(8) Other improper use of automatic belt system (specify):</p> <p>(9) Unknown</p>	
<p>ARE ALL APPLICABLE MEDICAL RECORDS INCLUDED WITH INITIAL SUBMISSION? NO [] YES [✓]</p> <p>UPDATE CANDIDATE? NO [] YES []</p>	

STOP - VARIABLES 50 THROUGH 53 ARE COMPLETED BY THE ZONE CENTER

TRAUMA DATA

50. Glasgow Coma Scale (GCS) Score 01
 (at Medical Facility)
 (00) Not injured
 (01) Injured - not treated at medical facility
 (02) No GCS Score at medical facility
 (03-15) Code the actual value of the initial GCS Score recorded at medical facility.
 (97) Injured, details unknown
 (99) Unknown if injured

51. Was the Occupant Given Blood? 1
 (1) No - blood not given
 (2) Yes - blood given
 (specify units): _____
 (9) Unknown if blood given

52. Arterial Blood Gases (ABG) - HCO_3 01
 (00) Not injured
 (01) Injured, ABGs not measured or reported
 (02-50) Code the actual value of the HCO_3
 (96) ABGs reported, HCO_3 unknown
 (97) Injured, details unknown
 (99) Unknown if injured

BELT USE DETERMINATION

53. Primary Source of Belt Use Determination 1
 (0) Not equipped/not available/destroyed or rendered inoperative
 (1) Vehicle inspection
 (2) Official injury data
 (3) Driver/occupant interview
 (8) Other (specify): _____
 (9) Unknown if belt used

Appendix E:

NASS CDS Occupant Injury Form

**Including: Coroner's Record,
Death Certificate,
Laboratory Report, and
Emergency Medical Services Record**



U.S. Department of Transportation
National Highway Traffic Safety
Administration

OCCUPANT INJURY FORM

Form Approved
O.M.B. No. 2127-0021
NATIONAL ACCIDENT SAMPLING SYSTEM
CRASHWORTHINESS DATA SYSTEM

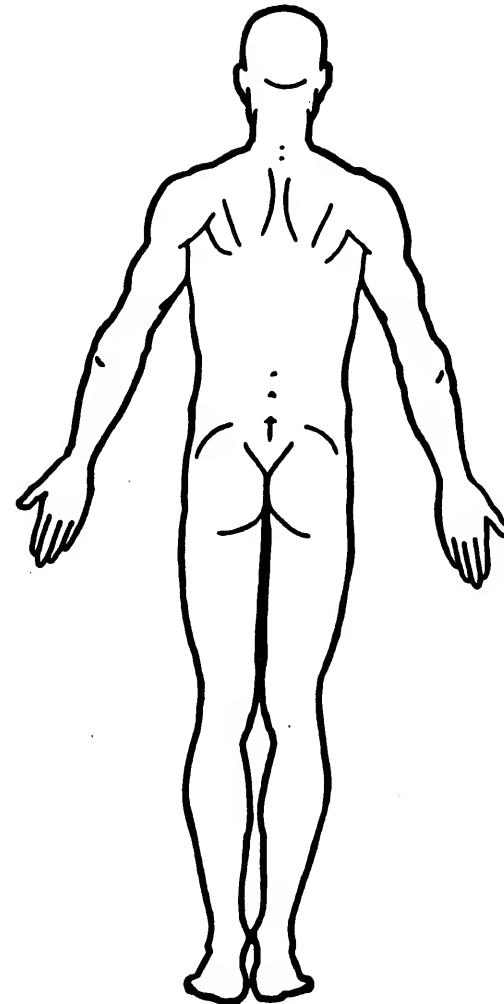
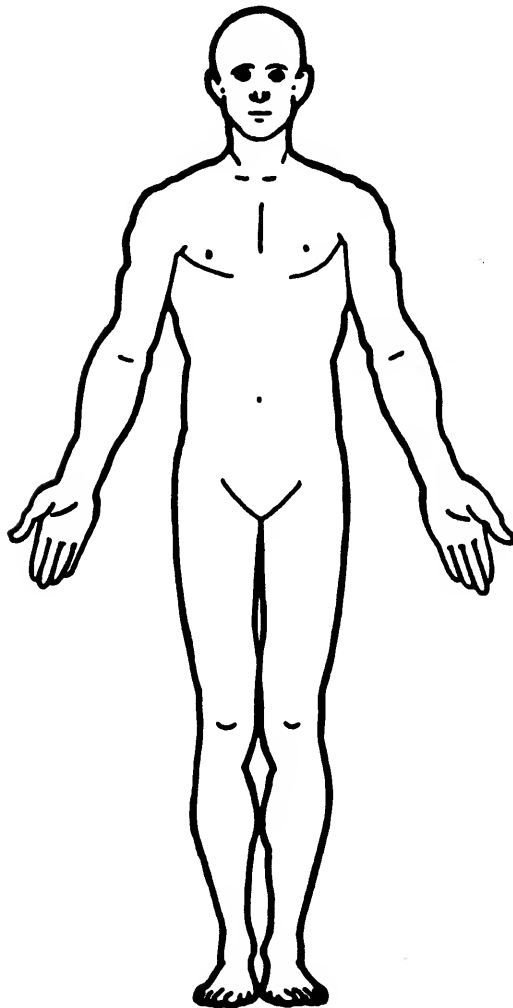
<div style="display: flex; justify-content: space-between;"><div>1. Primary Sampling Unit Number <div style="border-bottom: 1px solid black; width: 100px; text-align: center;">10</div></div><div>3. Vehicle Number <div style="border-bottom: 1px solid black; width: 100px; text-align: center;">01</div></div></div> <div style="display: flex; justify-content: space-between;"><div>2. Case Number - Stratum <div style="border-bottom: 1px solid black; width: 100px; text-align: center;">9404</div></div><div>4. Occupant Number <div style="border-bottom: 1px solid black; width: 100px; text-align: center;">01</div></div></div>	<div style="background-color: black; color: white; text-align: center; padding: 5px;">INJURY DATA</div> <p style="font-size: small; margin-top: 10px;">Record below the actual injuries sustained by this occupant that were identified from the official and unofficial data sources. Remember not to double count an injury just because it was identified from two different sources. If greater than ten injuries have been documented, encode the balance on the Occupant Injury Supplement.</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: x-small;"><thead><tr><th></th><th>Source of Injury Data</th><th>Body Region</th><th>Type of Anatomic Structure</th><th>Specific Anatomic Structure</th><th>Level of Injury</th><th>A.I.S. Severity</th><th>Aspect</th><th>Injury Source</th><th>Injury Source Confidence Level</th><th>Direct/ Indirect Injury</th><th>Occupant Area Intrusion Number</th></tr></thead><tbody><tr><td>1st</td><td>5. <u>1</u></td><td>6. <u>3</u></td><td>7. <u>1</u></td><td>8. <u>10</u></td><td>9. <u>00</u></td><td>10. <u>6</u></td><td>11. <u>0</u></td><td>12. <u>41</u></td><td>13. <u>2</u></td><td>14. <u>1</u></td><td>15. <u>00</u></td></tr><tr><td>2nd</td><td>16. <u>1</u></td><td>17. <u>8</u></td><td>18. <u>5</u></td><td>19. <u>18</u></td><td>20. <u>00</u></td><td>21. <u>3</u></td><td>22. <u>2</u></td><td>23. <u>28</u></td><td>24. <u>3</u></td><td>25. <u>1</u></td><td>26. <u>00</u></td></tr><tr><td>3rd</td><td>27. <u> </u></td><td>28. <u> </u></td><td>29. <u> </u></td><td>30. <u> </u></td><td>31. <u> </u></td><td>32. <u> </u></td><td>33. <u> </u></td><td>34. <u> </u></td><td>35. <u> </u></td><td>36. <u> </u></td><td>37. <u> </u></td></tr><tr><td>4th</td><td>38. <u> </u></td><td>39. <u> </u></td><td>40. <u> </u></td><td>41. <u> </u></td><td>42. <u> </u></td><td>43. <u> </u></td><td>44. <u> </u></td><td>45. <u> </u></td><td>46. <u> </u></td><td>47. <u> </u></td><td>48. <u> </u></td></tr><tr><td>5th</td><td>49. <u> </u></td><td>50. <u> </u></td><td>51. <u> </u></td><td>52. <u> </u></td><td>53. <u> </u></td><td>54. <u> </u></td><td>55. <u> </u></td><td>56. <u> </u></td><td>57. <u> </u></td><td>58. <u> </u></td><td>59. <u> </u></td></tr><tr><td>6th</td><td>60. <u> </u></td><td>61. <u> </u></td><td>62. <u> </u></td><td>63. <u> </u></td><td>64. <u> </u></td><td>65. <u> </u></td><td>66. <u> </u></td><td>67. <u> </u></td><td>68. <u> </u></td><td>69. <u> </u></td><td>70. <u> </u></td></tr><tr><td>7th</td><td>71. <u> </u></td><td>72. <u> </u></td><td>73. <u> </u></td><td>74. <u> </u></td><td>75. <u> </u></td><td>76. <u> </u></td><td>77. <u> </u></td><td>78. <u> </u></td><td>79. <u> </u></td><td>80. <u> </u></td><td>81. <u> </u></td></tr><tr><td>8th</td><td>82. <u> </u></td><td>83. <u> </u></td><td>84. <u> </u></td><td>85. <u> </u></td><td>86. <u> </u></td><td>87. <u> </u></td><td>88. <u> </u></td><td>89. <u> </u></td><td>90. <u> </u></td><td>91. <u> </u></td><td>92. <u> </u></td></tr><tr><td>9th</td><td>93. <u> </u></td><td>94. <u> </u></td><td>95. <u> </u></td><td>96. <u> </u></td><td>97. <u> </u></td><td>98. <u> </u></td><td>99. <u> </u></td><td>100. <u> </u></td><td>101. <u> </u></td><td>102. <u> </u></td><td>103. <u> </u></td></tr><tr><td>10th</td><td>104. <u> </u></td><td>105. <u> </u></td><td>106. <u> </u></td><td>107. <u> </u></td><td>108. <u> </u></td><td>109. <u> </u></td><td>110. <u> </u></td><td>111. <u> </u></td><td>112. <u> </u></td><td>113. <u> </u></td><td>114. <u> </u></td></tr></tbody></table>		Source of Injury Data	Body Region	Type of Anatomic Structure	Specific Anatomic Structure	Level of Injury	A.I.S. 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OCCUPANT INJURY DATA

	A.I.S. - 90							Injury Source Confidence Level	Direct/ Indirect Injury	Occupant Area Intrusion Number
Source of Injury Data	Body Region	Type of Anatomic Structure	Specific Anatomic Structure	Level of Injury	A.I.S. Severity	Aspect	Injury Source			
11th	—	—	—	---	---	—	---	—	—	---
12th	—	—	—	---	---	—	---	—	—	---
13th	—	—	—	---	---	—	---	—	—	---
14th	—	—	—	---	---	—	---	—	—	---
15th	—	—	—	---	---	—	---	—	—	---
16th	—	—	—	---	---	—	---	—	—	---
17th	—	—	—	---	---	—	---	—	—	---
18th	—	—	—	---	---	—	---	—	—	---
19th	—	—	—	---	---	—	---	—	—	---
20th	—	—	—	---	---	—	---	—	—	---
21st	—	—	—	---	---	—	---	—	—	---
22nd	—	—	—	---	---	—	---	—	—	---
23rd	—	—	—	---	---	—	---	—	—	---
24th	—	—	—	---	---	—	---	—	—	---
25th	—	—	—	---	---	—	---	—	—	---

OFFICIAL INJURY DATA — SOFT TISSUE INJURIES

Indicate the Location, Specific Anatomic Structure, Detail (size, depth, fracture type, head injury clinical signs and neurological deficits), and Source of all injuries indicated by official sources (or from PAR or other unofficial sources if medical records and interviewee data are unavailable.)



SOURCE OF INJURY DATA**OFFICIAL**

- (1) Autopsy records with or without hospital/medical records
- (2) Hospital/medical records other than emergency room (e.g., discharge summary)
- (3) Emergency room records only (including associated X-rays or other lab reports)
- (4) Private physician, walk-in or emergency clinic

UNOFFICIAL

- (5) Lay coroner report
- (6) E.M.S. personnel
- (7) Interviews
- (8) Other source (specify): _____
- (9) Police

INJURY SOURCE**FRONT**

- (01) Windshield
- (02) Mirror
- (03) Sunvisor
- (04) Steering wheel rim
- (05) Steering wheel hub/spoke
- (06) Steering wheel (combination of codes 04 and 05)
- (07) Steering column, transmission selector lever, other attachment
- (08) Add on equipment (e.g., CB, tape deck, air conditioner)
- (09) Left instrument panel and below
- (10) Center instrument panel and below
- (11) Right instrument panel and below
- (12) Glove compartment door
- (13) Knee bolster
- (14) Windshield including one or more of the following: front header, A (A1/A2)-pillar, instrument panel, mirror, or steering assembly (driver side only)
- (15) Windshield including one or more of the following: front header, A (A1/A2)-pillar, instrument panel, or mirror (passenger side only)
- (16) Driver side air bag compartment cover
- (17) Passenger side air bag compartment cover
- (18) Windshield reinforced by exterior object (specify): _____
- (19) Other front object (specify): _____

LEFT SIDE

- (20) Left side interior surface, excluding hardware or armrests
- (21) Left side hardware or armrest
- (22) Left A (A1/A2)-pillar
- (23) Left B-pillar
- (24) Other left pillar (specify): _____

- (25) Left side window glass or frame
- (26) Left side window glass including one or more of the following: frame, window sill, A (A1/A2)-pillar, B-pillar, or roof side rail.
- (27) Other left side object (specify): _____

- (28) Left side window sill

RIGHT SIDE

- (30) Right side interior surface, excluding hardware or armrests
- (31) Right side hardware or armrest
- (32) Right A (A1/A2)-pillar
- (33) Right B-pillar
- (34) Other right pillar (specify): _____

- (35) Right side window glass or frame
- (36) Right side window glass including one or more of the following: frame, window sill, A (A1/A2)-pillar, B-pillar, or roof side rail.
- (37) Other right side object (specify): _____

- (38) Right side window sill

INTERIOR

- (40) Seat, back support
- (41) Belt restraint webbing/buckle
- (42) Belt restraint B-pillar or door frame attachment point
- (43) Other restraint system component (specify): _____
- (44) Head restraint system
- (45) Air bag (use codes "16" and "17" for injuries sustained from air bag compartment covers)
- (46) Other occupants (specify): _____
- (47) Interior loose objects
- (48) Child safety seat (specify): _____
- (49) Other interior object (specify): _____

ROOF

- (50) Front header
- (51) Rear header
- (52) Roof left side rail
- (53) Roof right side rail
- (54) Roof or convertible top

FLOOR

- (56) Floor (including toe pan)
- (57) Floor or console mounted transmission lever, including console
- (58) Parking brake handle
- (59) Foot controls including parking brake

REAR

- (60) Backlight (rear window)

- (61) Backlight storage rack, door, etc.
- (62) Other rear object (specify): _____

EXTERIOR OF OCCUPANT'S VEHICLE

- (65) Hood
- (66) Outside hardware (e.g., outside mirror, antenna)
- (67) Other exterior surface or tires (specify): _____
- (68) Unknown exterior objects

EXTERIOR OF OTHER MOTOR VEHICLE

- (70) Front bumper
- (71) Hood edge
- (72) Other front of vehicle (specify): _____

- (73) Hood
- (74) Hood ornament
- (75) Windshield, roof rail, A-pillar
- (76) Side surface
- (77) Side mirrors
- (78) Other side protrusions (specify): _____

- (79) Rear surface
- (80) Undercarriage
- (81) Tires and wheels
- (82) Other exterior of other motor vehicle (specify): _____

- (83) Unknown exterior of other motor vehicle

OTHER VEHICLE OR OBJECT IN THE ENVIRONMENT

- (84) Ground
- (85) Other vehicle or object (specify): _____
- (86) Unknown vehicle or object

NONCONTACT INJURY

- (90) Fire in vehicle
- (91) Flying glass
- (92) Other noncontact injury source (specify): _____
- (93) Air bag exhaust gases
- (97) Injured, unknown source

INJURY SOURCE CONFIDENCE LEVEL

- (1) Certain
- (2) Probable
- (3) Possible
- (9) Unknown

DIRECT/INDIRECT INJURY

- (1) Direct contact injury
- (2) Indirect contact injury
- (3) Noncontact injury
- (7) Injured, unknown source

OCCUPANT INJURY CLASSIFICATION

Body Region	Specific Anatomic Structure	Spine	Abbreviated Injury Scale
(1) Head	<u>Whole Area</u>	(02) Cervical	(1) Minor injury
(2) Face	(02) Skin - Abrasion	(04) Thoracic	(2) Moderate injury
(3) Neck	(04) Skin - Contusion	(06) Lumbar	(3) Serious injury
(4) Thorax	(06) Skin - Laceration		(4) Severe injury
(5) Abdomen	(08) Skin - Avulsion	<u>Vessels, Nerves, Organs, Bones, Joint</u> are assigned consecutive two digit numbers beginning with 02	(5) Critical injury
(6) Spine	(10) Amputation		(6) Maximum (untreatable)
(7) Upper Extremity	(20) Burn		(7) Injured, unknown severity
(8) Lower Extremity	(30) Crush		
(9) Unspecified	(40) Degloving	Level of Injury	Aspect
	(50) Injury - NFS	Specific injuries are assigned consecutive two-digit numbers beginning with 02.	(1) Right
Type of Anatomic Structure	(90) Trauma, other than mechanical		(2) Left
(1) Whole Area	<u>Head - LOC</u>		(3) Bilateral
(2) Vessels	(02) Length of LOC		(4) Central
(3) Nerves	(04, 06, 08) Level of Consciousness		(5) Anterior
(4) Organs (includes muscles/ligaments)	(10) Concussion		(6) Posterior
(5) Skeletal (includes joints)		To the extent possible, within the organizational framework of the AIS, 00 is assigned to an injury NFS as to severity or where only one injury is given in the dictionary for that anatomic structure. 99 is assigned to any injury NFS as to lesion or severity.	(7) Superior
(6) Head - LOC			(8) Inferior
(9) Skin			(9) Unknown
			(0) Whole region

OFFICIAL INJURY DATA — SKELETAL INJURIES

Restrained?

☐ No
☒ Yes

Blood Alcohol Level (mg/dl)

BAL = 0

Glasgow Coma Scale Score

GCSS = 0

Units of Blood Given

Units = 0

Arterial Blood Gases

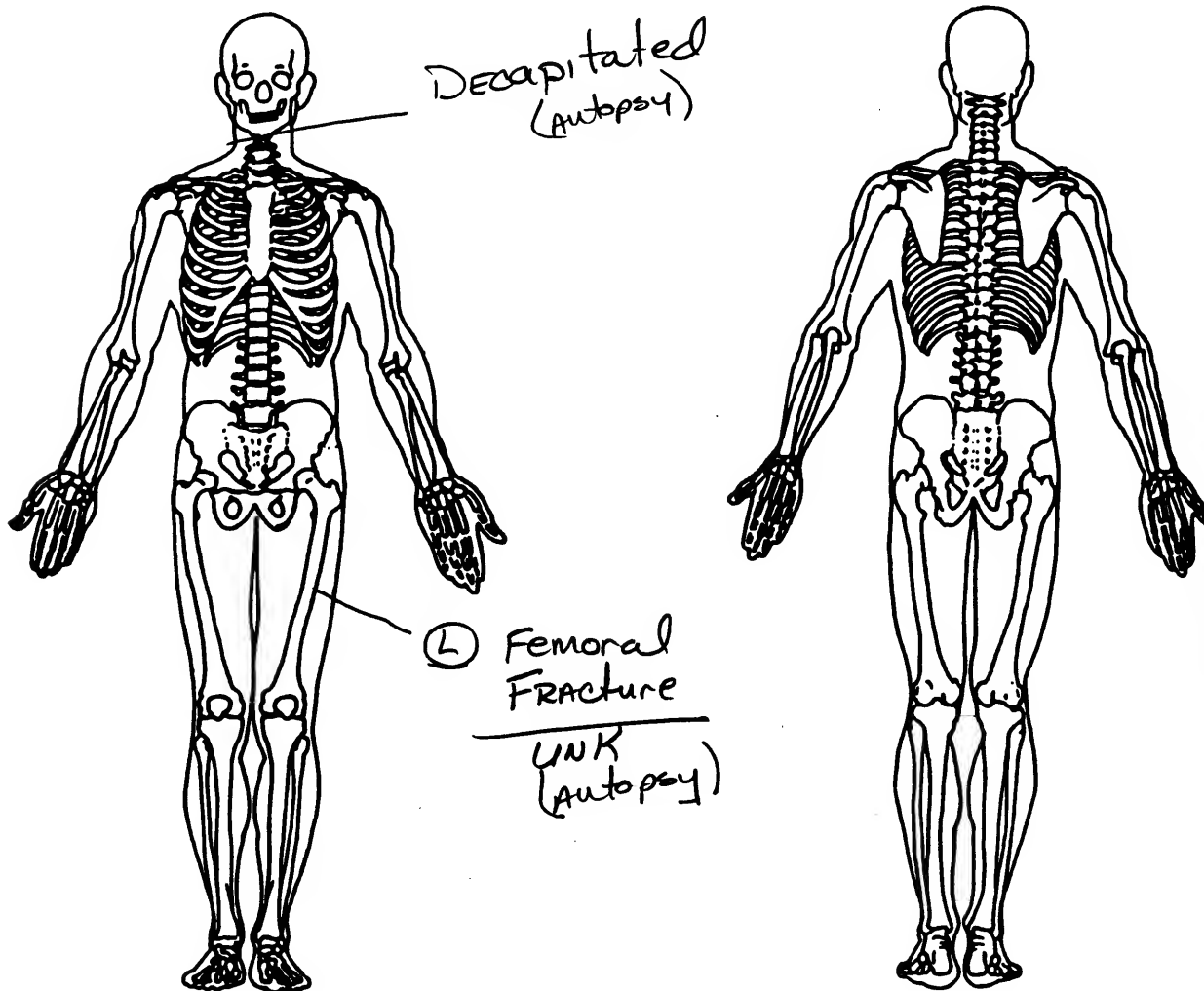
pH =

PO₂ =

PCO₂ =

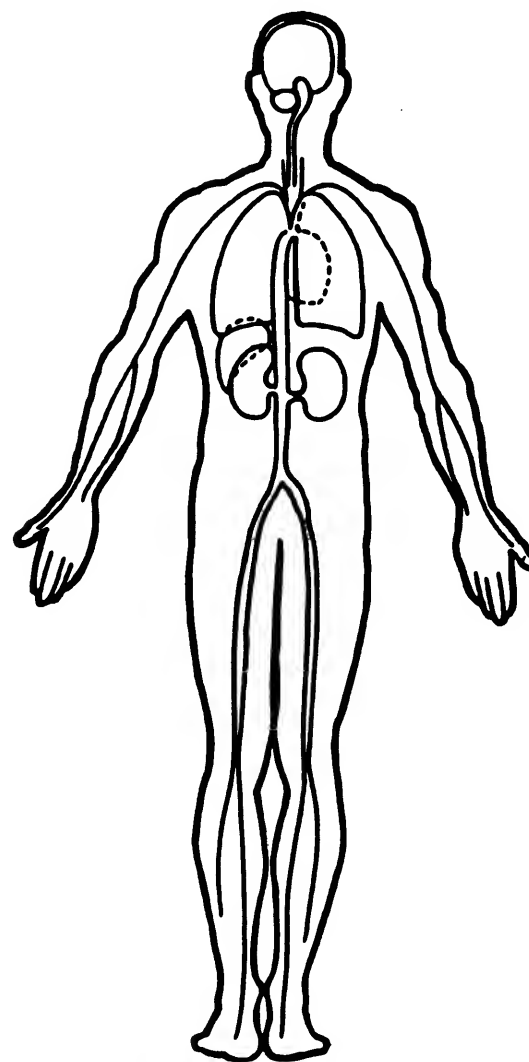
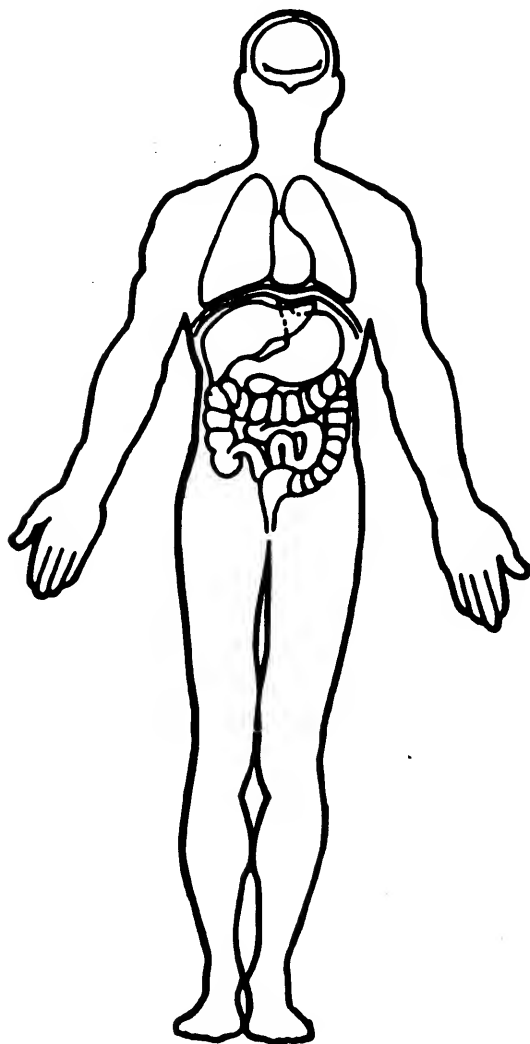
HCO₃ =

Indicate the Location, Specific Anatomic Structure, Detail (size, depth, fracture type, head injury clinical signs and neurological deficits), and Source of all injuries indicated by official sources (or from PAR or other unofficial sources if medical records and interviewee data are unavailable.)



OFFICIAL INJURY DATA — INTERNAL INJURIES

Indicate the Location, Specific Anatomic Structure, Detail (size, depth, fracture type, head injury clinical signs and neurological deficits), and Source of all injuries indicated by official sources (or from PAR or other unofficial sources if medical records and interviewee data are unavailable.)



COUNTY CORONER

Social Security No. [REDACTED] DATE 1990

Deceased [REDACTED] [REDACTED] [REDACTED] 21 DOB 1
Last First Middle Age M D

M B Color B S M D W Sep. Address [REDACTED]

Next of Kin [REDACTED] Relationship Grandmother Phone NONE

Probable Manner of Death: Homicide Suicide Accident Natural Unknown

Place of Death Highway 1 1/2 mi N NEAR [REDACTED] home

Date & Time Pronounced 8:10 PM 90 Rec Call 7:55 PM

D/O Death 7 PM 90 Weather Fair Temp. 40°

Officers TROOPER [REDACTED]

Police or Sheriff Department [REDACTED]

Doctor _____ Phone _____ Date Last Seen _____

Medications NONE to my knowledge

Remarks Vehicle headed W. on [REDACTED] Overturned several
times. Victim decapitated in accident. INSTANT DEATH
Left Femur Fractured.
Drew blood & urine for lab. Mailed 90 [REDACTED]

Date 1990 [REDACTED]
County Coroner

CERTIFICATE OF DEATH

BEST AVAILABLE

1. DECEASED—NAME First Last (Print last name of deceased)		2. DATE OF BIRTH Month, Day, Year 1990	3. COUNTY OF DEATH
4a. CITY, TOWN, OR LOCATION OF DEATH AND ZIP CODE		4b. INSIDE CITY LIMITS (Specify Yes or No) No	4c. PLACE OF DEATH—HOSPITAL OR OTHER INSTITUTION—(If not an address, give street and number) H'Way 1/2 Mi W.
4d. IF HOSPITAL (Specify Institution, (A or Outpatient, BGA))		5a. OF HISPANIC ORIGIN (Specify Yes or No) If yes, Specify Cuban, Mexican, Puerto Rican, etc. No	5b. RACE—(Specify American Indian, Black, White, etc.) Black
6a. AGE 21 YRS		6b. UNDER 1 YEAR MONTHS DAYS HOURS MINES	6c. UNDER 1 DAY DATE OF BIRTH (Month, Day, Year)
7. DECEASED'S SOCIAL SECURITY NUMBER		8. DECEASED'S SEX Fema	
9. EDUCATION (Specify ONLY highest grade completed BELOW) a. ELEMENTARY/SECONDARY (Specify 8-12) 12		10. MARRIAGE STATUS (Specify Married, Never Married, Widowed, Divorced) Single	
11. STATE OF BIRTH (If not in USA, name country)		12. RESIDENCE—STATE	
13. INSIDE CITY LIMITS (Specify Yes or No) No		14. STREET AND NUMBER	
15. USUAL OCCUPATION (Give kind of work done during most of working life even if retired) Seamstress		16. KIND OF BUSINESS OR INDUSTRY Clothing Mfg.	
17. FATHER—NAME First Middle Last		18. MOTHER—MAIDEN NAME First Middle Last	
19a. DISPOSITION OF BODY (Specify Burial, Cremation, Medical Donation, Hospital Disposal, Other) Buried		19b. DATE OF DISPOSITION (Month, Day, Year) 1990	
20a. CEMETERY OR CREMATORIUM—Name		20b. LOCATION—(City or Town—State)	
21. FUNERAL HOME—Name and Address Funeral home		22. DATE OF FUNERAL (Month, Day, Year) 19	
23a. Certifying Physician (Physician certifying cause of death) To the best of my knowledge death occurred at the time, date and place, and due to the causes and manner stated		23b. Medical Examiner (On the basis of examination and/or investigation in my opinion, death occurred, date and place, and due to the causes and manner stated)	
23c. I attended the deceased from Month Day Year 10		23d. I removed the body after death (Specify Yes or No) YES	
23e. HOUR OF DEATH		23f. THE DECEASED WAS PROCLAIMED DEAD (Month, Day, Year) 1990	
23g. HOUR OF DEATH 7:04			
24. PHYSICIAN'S NAME and Address		25. CERTIFIER—PHYSICIAN—MEDICAL EXAMINER/FORENSIC OR HEALTH OFFICER (Type Name)	
26. MAILING ADDRESS—CERTIFIER (Street or R.F.D. No., City or Town, State, Zip)		27. PHYSICIAN'S SIGNATURE	
28a. DATE SIGNED (Month, Day, Year) 1990		28b. CERTIFIER LICENSE NUMBER	
29a. REGISTRATION—Signature		29b. DATE REGISTERED (LOCAL)	
30. MEDICAL CERTIFICATION			
31. PART I. Enter the disease, injury, or complication that caused the death. Do not enter the mode of dying, such as cardiac or respiratory arrest, shock, or heart failure. LIST ONLY ONE CAUSE. APPROXIMATE INTERVAL BETWEEN ONSET AND DEATH. ON EACH LINE 1. <u>Decapitation</u> SECOND 2. <u>Motor Vehicle Accident</u> SECOND 3. <u>Due to ICH as a consequence of</u> 4. <u>Due to ICH as a consequence of</u>			
32. PART II. Other significant conditions contributing to death but not resulting in the underlying cause given on Part I.		33. Was there a PREGNANT (Specify Yes or No) NO	
34. MANNER OF DEATH (Specify—Accident, Suicide, Unnatural Circumstances, Pending Investigation, Natural Cause) Accident		35. If you were findings considered in the cause of death (Specify Yes or No)	
36a. HOW PLACED OCCURRED (Specify nature of injury on Part I, item 28 or Part II, item 32)		36b. DATE OF BIRTH (Month, Day, Year)	
36c. HOUR OF BIRTH		36d. PLACE OF BIRTH (Specify Yes or No)	
36e. LOCATION OF BIRTH (Specify Yes or No)		36f. LOCATION OF BIRTH (Specify Yes or No)	

STATE OF
COUNTY OF

19 90

THIS IS TO CERTIFY THAT THE ABOVE IS A COPY OF THE ORIGINAL DEATH CERTIFICATE SUBMITTED TO THIS OFFICE.

COUNTY REGISTRAR

BEST AVAILABLE

Case No.

Report To: Name and Address		Laboratory Investigator	
Trooper [REDACTED] P. O. Box [REDACTED]		Signature [REDACTED]	
cc: Coroner [REDACTED] P. O. [REDACTED]		Printed Name and Title [REDACTED], Toxicologist	
		Date Reported 1990	Time Reported 1640

RE-HOSPITAL EMERGENCY MEDICAL REPORT

Service Name Unit No. Run Report No. LOCATION OF CALL: Hwy 1 mile W. ofCode IIIPatient's Name: Sex BF Age 21 O.D.B. unk Date: 7-20-90Patients Address: Telephone: unk Call Received 7:20 PCity State Zip Call Dispatched 7:20 PHISTORY: Chief Complaint: MVA 10A Arrived Location 7:31 PMed. History unk Departed Scene 8:34 PMedications unk Arrived Destination 8:52Allergies: unk Family MD: unk MILEAGE: Beginning: At Scene: To Dest: 11.0 Ending:

PATIENT SIGNS:

Time B/P Pulse Resp.

7:20	110/70	60	0
7:30	110/70	60	0
7:40	110/70	60	0
7:50	110/70	60	0
8:00	110/70	60	0
8:10	110/70	60	0
8:20	110/70	60	0
8:30	110/70	60	0
8:40	110/70	60	0
8:50	110/70	60	0
9:00	110/70	60	0
9:10	110/70	60	0
9:20	110/70	60	0
9:30	110/70	60	0
9:40	110/70	60	0
9:50	110/70	60	0
10:00	110/70	60	0
10:10	110/70	60	0
10:20	110/70	60	0
10:30	110/70	60	0
10:40	110/70	60	0
10:50	110/70	60	0
11:00	110/70	60	0
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23:30	110/70	60	0
23:40	110/70	60	0
23:50	110/70	60	0
24:00	110/70	60	0

Consciousness:

- 66 ☐ Conscious
 67 ☐ Respond Voice
 68 ☐ Respond Pain
 69 ☐ Non-responsive
 70 ☒ Apparently Dead

Skin:

- 71 ☐ Normal
 72 ☐ Hot, Dry
 73 ☐ Moist
 74 ☐ Cool/Wet
 75 ☐ Cool/Dry

Color:

- 76 ☐ Normal
 77 ☐ Cyanotic
 78 ☐ Pale/Ashen
 79 ☐ Flushed

Emotional Status:

- 58 ☐ Calm
 59 ☐ Agitated
 60 ☐ Screaming
 61 ☐ Combative

Pain Status:

- 62 ☐ None
 63 ☐ Minimal
 64 ☐ Moderate
 65 ☐ Severe

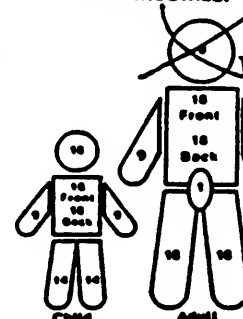
Pupils:

- 80 ☐ Responsive
 81 ☐ Dilated/Fixed
 82 ☐ Unequal
 ☐ right
 ☐ left
 84 ☐ Pinpoint
 85 ☐ Sluggish
 86 ☐ Blind
 ☐ right
 ☐ left

Speech:

- 87 ☐ Coherent
 88 ☐ Incoherent
 89 ☐ Hysterical
 90 ☐ Silent

SITE OF INJURIES:



ASSESSMENT AND PATIENT MANAGEMENT:

MEDICAL:

- 91 ☐ Cardiac Arrest
 92 ☐ Chest Pain
 93 ☐ Breathing Diff
 94 ☐ Diabetic
 95 ☐ Seizure
 96 ☐ Stroke
 97 ☐ General Med

- 98 ☐ OB/GYN
 99 ☐ Neonate

TRAUMA:

- 100 ☐ Spinal
 101 ☐ Sprain/Strain
 102 ☐ Open/closed Wound
 103 ☐ Fracture/Dislocation
 104 ☐ Burn %
 105 ☐ Head Injury Decapitation
 106 ☐ Multiple Trauma

POISON:

- 107 ☐ Drugs/OD
 108 ☐ Organic
 109 ☐ Alcohol
 110 ☐ Insect
 111 ☐ Snake

COMMUNICATIONS:

- 112 ☐ UHF
 113 ☐ VHF
 114 ☐ PHONE

ORDERS ☐ YES ☒ NOMD CONTACTED: HOSPITAL: PT. DESTINATION Hwy

CARE RENDERED:

- 115 ☐ Oxygen
 116 ☐ Suctioning
 117 ☐ Oral Airway
 118 ☐ Art. Resp.
 119 ☐ CPR
 120 ☐ Spine Board
 121 ☐ Cervical Co.
 122 ☐ CID
 123 ☐ KED
 124 ☐ Splints
 125 ☐ Traction
 126 ☐ Sterile Sheet
 127 ☐ MAST
 128 ☐ Control Bleeding
 129 ☐ Dressing/Bandages
 130 ☐ Lung Seal
 131 ☐ OB/Del
 132 ☐ Restraints
 133 ☐ Transport Only
 134 ☐ Other
 135 ☐ EKG Monitor
 136 ☐ Drugs used
 137 ☐ Extrication
 138 ☐ IV's
 139 ☐ Coroner Called
 Time: A.M/P

COMMENTS:

Pt. lying on ground in front of vehicle. Body covered in blood. Head was completely decapitated. Shoulder level. Head was located intact approx 50 yards east of body. Coroner notified. No other occupants involved.

Pt. transported in body bag to Hwy per code of and released to RR.

REFUSAL OF SERVICE:

Although it is available, I do not wish and hereby refuse (emergency treatment) and (ambulance service).

Signature: Date/Time: Initials

Extended Care Report

Yes No

RUN DISPOSITION:

- 140 ☐ Treated not Transported
 141 ☐ Treated and Transported
 142 ☐ Transported by POV
 143 ☐ Requested but refused
 144 ☐ Unable to locate
 145 ☐ Fire Standby
 146 ☐ No services needed
 147 ☐ Other
 148 ☐ Protocol Followed

EMT SIGNATURES:

Tech.
 Tech.
 Tech.
 Driver

TRANSPORTATION RESEARCH CENTER

**Indiana University
Indiana**

ON-SITE AUTOMATIC SHOULDER BELT INVESTIGATION

**Plaintiff's Court Documents
and Testimony in U.S. District Court
of Plaintiff's Expert Witness**

**CASE NO. - 94-04
FLEET - PRIVATE VEHICLE
LOCATION -
ACCIDENT DATE - 1990**

Submitted By:

1994

Contract Number: DTNH22-94-A-07048

Prepared for:

**U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590**

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Deposition {Excerpt} of One of the
_____ Police officers
[pages 39-46]

1 resource material where you used -- that we used for
2 the range of drag factors.

3 Q. You have one for it sliding. I don't see
4 anywhere in the report about the use of a
5 coefficient for the distance traveled for a vehicle
6 that is in roll.

7 A. What we did due to the -- after we
8 examined the vehicle, we went ahead and just more or
9 less did it as metal sliding on grass or, in this
10 particular case, in dirt. We used it that way
11 instead of a rollover.

12 Q. What is that coefficient, do you recall?

13 A. It was a range of 30 to 50.

14 Q. What is the rollover coefficient?

15 A. I don't recall that.

16 Q. There are two things in this report that
17 I want to ask you about, and see if they represent
18 your opinion. One is the report contains the
19 statement that [REDACTED] was decapitated by the
20 seatbelt?

21 A. Yes, sir.

22 Q. Or by the shoulder belt. Who made that
23 judgment?

24 A. We were -- when we were employed on this
25 particular case, [REDACTED] told us that he felt like

1 the seatbelt had caused a fatal injury. He wanted
2 us to determine several things and, among them, one
3 was whether or not the seatbelt had or had not -- or
4 shoulder belt -- had or had not caused fatal
5 injury.

6 We examined the vehicle, examined the
7 scene. Of course, we didn't have a chance to
8 examine the body. Nobody did, I don't think. We
9 did examine the seatbelt system in the car and it
10 was our opinion that it -- that that was more than
11 likely the cause of the decapitation.

12 Q. Tell me, if you would, each and every
13 reason why you think that.

14 A. Okay, sir. First of all, after
15 interviewing the funeral director, he advised us
16 that it was a very smooth cut. It was not jagged,
17 ripped. It was as if a scalpel or sharp instrument,
18 something very sharp, had done the job.

19 Also, he advised us that there was not a
20 whole lot of deformation of the lady's head or of
21 her body, either one, other than a few scrapes or a
22 bruise after death, but on the face. I believe he
23 mentioned the face had a few scratches. The
24 vehicle, after examining it, the shoulder belt was
25 not in there at the time we examined it, but we

1 examined the lap belt.

2 There are some things that are
3 indicators. In this particular case, we took the
4 housing off of the side where the ratchet assembly
5 is on the seatbelt, lap belt. There was no
6 indication of any metal fatigue, no indication of
7 any stretching of the webbing. There was no
8 indication that it had been put under stress, which
9 to me would indicate that it had not been in use at
10 the time of the accident.

11 We examined the vehicle on the inside and
12 the only blood or any sign of any injury was one
13 spot of blood probably smaller than a dime generally
14 on the top of the back seat, which would indicate to
15 me that there was some kind of injury inside the
16 vehicle; however slight or major, there is no
17 telling, but there was some blood inside the
18 vehicle.

19 We examined the outside of the vehicle.
20 We could find no surface at all that would account
21 for a clean, smooth cut like that. We found no
22 hair, blood. We found no flesh. We found nothing
23 on the outside of the vehicle that would indicate
24 that any part of her body was touched.

25 Also, if you have a crush decapitation,

1 as in the person where they come out through the
2 sunroof, side, whatever, the head comes out, the
3 body stays in, the car rolls over on it, you have
4 quite a bit of soft tissue damage on the head or
5 body or both.

6 The reports that we had from the mortuary
7 were that -- and also the farmer across the road,
8 said her head was just there. It wasn't squished,
9 mushed. It was just laying there, so -- as a matter
10 of fact, he said something about he stuck a piece of
11 taillight lense up in the ground that night to keep
12 people from walking on it because he didn't want to
13 damage it any more.

14 Due to the condition of the body and the
15 condition of the vehicle, the condition of the
16 seatbelt and the statements we had from persons that
17 had seen the body, we made that determination as our
18 opinion, although I realize we are not medical
19 examiners and we are not engineers, either, but we
20 were asked for our opinion, and that's what it was.

21 Q. You feel comfortable giving an opinion
22 like that in court?

23 A. As an opinion, yes, sir.

24 Q. I mean, you feel qualified to give that
25 opinion?

1 A. As far as the statements I have just
2 made, yes, sir.

3 Q. Okay.

4 A. Like I say, I'm not a medical doctor.
5 I'm not a forensics man. I'm not an engineer; but
6 as far as training, experience, you know, goes, the
7 statements I just made as to reasoning, I do feel
8 comfortable with it, yes, sir.

9 Q. What is it about the clean cut that you
10 think would implicate the seatbelt?

11 A. In my experience, webbing, web ropes,
12 nylon ropes, nylon webbing, belts, when they are
13 moved across a body at a high rate of speed, they
14 produce a cut that is -- it's like a paper cut. It
15 will cut you like a knife. A rope will burn because
16 of the shape of the rope. A webbed belt usually
17 will leave a cut. That's, again, my opinion.

18 Q. Let me make sure I understand your
19 experience. You are not testifying that you have
20 seen cuts made from a seatbelt before?

21 A. I have never seen cuts made from a
22 seatbelt before.

23 Q. All right. While we are talking about
24 that, you said something about the condition of the
25 seatbelt. Were you talking about the lap belt or

1 talking about the shoulder restraint?

2 A. Referring to the lap belt.

3 Q. You didn't see anything on the shoulder
4 restraint that caused you to think that it had
5 caused the decapitation?

6 A. At the particular time we examined the
7 vehicle, the shoulder belt was not in the vehicle.

8 Q. I believe there's been some testimony
9 here that [REDACTED] showed you the shoulder belt?

10 A. Yes, sir.

11 Q. You had a chance to inspect it?

12 A. Yes, sir.

13 Q. You didn't see anything on that that
14 caused you to think that it had been responsible for
15 the --

16 A. There was something on there, but I have
17 since learned that it tested negative. I have no
18 explanation for what it is, other than the substance
19 that was on there, though, that's all I saw on the
20 shoulder belt.

21 Q. Do you have any reason to think that if
22 the shoulder belt had been responsible, there would
23 have been some evidence on the belt like blood or
24 something else?

25 A. Realizing that nylon -- a nylon shoulder

1 belt or seatbelt is made out of hard, slick material
2 that's probably scotch-guarded to protect from
3 stains, I would not really expect it to be on there
4 in any great amount. Also, the speed of the motion
5 of the belt going through the neck would seem to me
6 to preclude a lot of gore being left on it.

7 Q. What do you mean by that?

8 A. Actually, my opinion -- again, of course,
9 to do it, it would have to be done fairly fast
10 because the whole accident scene wouldn't take but a
11 few seconds. The fact that probably during the
12 rollover, she went up towards the top as the top was
13 down and slid down at probably a high rate of speed
14 is probably -- well, to my mind, that's what did the
15 damage.

16 Q. Let me deal with the question about the
17 lap belt now. I think I understand what you're
18 saying. Your investigation suggested to you she was
19 not wearing the lap belt; is that correct?

20 A. Yes, sir.

21 Q. Do you have any explanation for that?

22 A. I do not.

23 Q. Do you have any information as to whether
24 she was aware that there was a lap belt?

25 A. I have no idea, no, sir.

1 Q. The next thing you said, there was a spot
2 of what you thought was blood at the top of the back
3 seat?

4 A. Yes, sir.

5 Q. Did you take a sample?

6 A. I did not.

7 Q. Did you photograph it?

8 A. I don't know whether we did or not. I
9 don't think we did.

10 Q. They have letters on the back. Let's do
11 a little housekeeping here before we get into that.
12 These are your photographs?

13 A. Yes, sir.

14 Q. Taken by you?

15 A. By myself and Sergeant [REDACTED].

16 Q. Just for the record, they have now been
17 identified as A through Z. If you will just look on
18 the back and confirm that. We had A through V and
19 four X's which we have since made W, X, Y, and Z?

20 A. Yes.

21 Q. Those are your photographs?

22 A. Yes, sir.

23 Q. Now, I interrupted you. I asked you to
24 show me -- to see if you had photographed the spot
25 you were referring to.

Deposition (Excerpt) of the

County Coroner

[pages 49-57]

1 Q. Tell me what else you did then. You
2 indicated that you drew urine. Where do you draw
3 the urine from?

4 A. I drew the urine from her bladder.

5 Q. Did you do that by way of a syringe?

6 A. By a syringe and a needle.

7 Q. And then what else did you do that night
8 at the [REDACTED] Hospital?

9 A. I examined her and found that her left
10 femur was broken, and she didn't have any personal
11 effects on her, any wallet or anything like that.
12 And I established that [REDACTED] was coming there
13 to pick her up, and I left her, in fact, under lock
14 and key. The duty nurse that night just assisted
15 me, that we left her under lock and key. And, when
16 [REDACTED] came, he was able to pick her up.

17 Q. Tell me about your examination of her
18 body. First of all, the femur, can you describe
19 that fracture?

20 A. Well, it was obvious that it was not a
21 compound. I don't believe it was a compound, but it
22 was obvious that it was broken because of
23 distortion.

24 Q. Compound, you mean when the bone
25 protrudes through the skin?

1 A. Right.

2 Q. Was there any blood in that area of her
3 body where the --

4 A. I don't recall any.

5 Q. I'd like to take you through your
6 examination of the body. Do you remember whether
7 you examined the head or the body first?

8 A. At the scene?

9 Q. No; this is at the hospital.

10 A. At the hospital, I examined her body.

11 Q. And her head, also?

12 A. Yeah.

13 Q. Do you remember which you examined first,
14 the head or the body?

15 A. I think the body because I was interested
16 in getting these blood and urine samples at the same
17 time.

18 Q. Other than the broken femur, did you
19 observe any other injuries to the body?

20 A. Not that serious.

21 Q. You said not that serious, how about less
22 serious?

23 A. Not serious enough to get my attention.

24 Q. I take it, then, and correct me if I'm
25 wrong, that you didn't observe any other broken

1 bones?

2 A. No.

3 Q. Did you examine her hands?

4 A. No.

5 Q. You did not?

6 A. (Witness shakes head negatively.)

7 Q. Tell me about -- let's start, I guess,
8 from the actual neck down in your examination of
9 her. Could you describe, then, this is again at the
10 hospital, what that wound looked like of where the
11 decapitation occurred?

12 A. I remember it was jagged but it was even
13 with her collarbone.

14 Q. When you say jagged, could you describe?

15 A. It was irregular. It was irregular.

16 Q. In what ways was it --

17 A. Like it was torn.

18 Q. And was there a particular side that was
19 torn, or was it torn all the way around?

20 A. I really don't know. I don't want to
21 testify. I really don't know which side. I think
22 that the left side was jagged, but I'm reluctant to
23 testify.

24 Q. And irregular or jagged, does that mean
25 uneven?

1 A. Uneven.

2 Q. I think earlier you described that she
3 would have been decapitated just above the
4 collarbone?

5 A. That's right.

6 Q. At the shoulders? Did you notice any
7 abrasions on her skin or pattern of abrasion on her
8 skin where that occurred?

9 A. No.

10 [REDACTED] I'm sorry. Was there an
11 audible answer?

12 [REDACTED] I think he said no.

13 Q. (By [REDACTED] Did you notice any
14 fibers from any foreign material on her neck at that
15 area where the decapitation occurred?

16 A. No.

17 Q. Did you observe any striation pattern or
18 any lines there where that occurred?

19 A. No.

20 Q. Did you observe any remnants of a seat
21 belt?

22 A. No.

23 Q. You talked earlier about the two fingers
24 -- her spine was sticking up, and you held up two
25 fingers earlier. Did you examine that during your

1 examination at the [REDACTED] Hospital?

2 A. Not closely, I didn't.

3 Q. Did your examination of her body at the
4 [REDACTED] Hospital, did that lead you to conclude
5 anything in addition to what you've told us earlier
6 about what that looked like, where what you thought
7 was her spine sticking out?

8 A. No, I'm sorry, I didn't.

9 Q. Did you notice any blood on her shoulders
10 or in her neck area when you examined her at the
11 hospital?

12 A. I don't recall any.

13 Q. Taking you now to your examination of her
14 head, did you notice any broken bones in her head?

15 A. No.

16 Q. Did you observe any swelling of her head?

17 A. No.

18 Q. Did you observe any broken teeth?

19 A. No.

20 Q. Did you observe any blood on her head?

21 A. I believe there was some blood on her
22 head. I don't know.

23 Q. Do you know where that would have been on
24 the head?

25 A. I can't -- I don't know. It's been so

1 long, and I don't know.

2 Q. Did you observe any scratches or scrapes
3 on her face?

4 A. No.

5 Q. Did you observe any bruising or
6 contusions of her face or head?

7 A. No.

8 Q. Did you observe anything out of the
9 ordinary with her eyes?

10 A. No.

11 Q. How about did you observe anything out of
12 the ordinary with her ears?

13 A. No.

14 Q. Could you describe what the sides of her
15 neck looked like?

16 [REDACTED] Let me just ask for a
17 clarification. Are you asking about the
18 wound on the side of her head or --

19 THE WITNESS: What's left?

20 [REDACTED] -- what's left?

21 Q. (By [REDACTED]) I'm talking about what
22 was first left of the neck, and then we'll get down
23 to the actual where her head was separated.

24 A. Well, her neck was shortened, and it had
25 contracted some. And, where a person's neck would

1 be -- of her size, would be of relative length, 5 or
2 6 inches long, it wasn't that long.

3 Q. Did you at any time get her dimensions
4 prior to the accident?

5 A. No, I didn't. I never had a driver's
6 license.

7 Q. Then, if you would, then, describe what
8 her neck looked like at the point where her head had
9 been severed, what that area looked like?

10 A. You remember awhile ago I testified
11 clean, with the exception of the jagged edges, and I
12 think it was on the left side there was jagged
13 edges. But, with the exception of that, it was
14 clean. And, with her shoulders -- her head was cut
15 off with the shoulders with the exception of this
16 protrusion that came up out of her spine.

17 Q. When you say clean, does that mean the
18 absence of -- and I don't want to put words in your
19 mouth -- cuts or scrapes or abrasions?

20 A. Yeah, absence of any material or
21 anything, and she was clothed.

22 Q. Do you remember what she was wearing?

23 A. It seems that I think she was wearing
24 blue jeans and a little, just a little brief top
25 with short sleeves and so on.

1 Q. Did you observe any blood on her
2 clothing?

3 A. I'm sure there was, but I don't know. I
4 couldn't testify that there was.

5 Q. Do you know what happened to her clothing
6 after this accident?

7 A. No. Her clothing went with her to [REDACTED]
8 Funeral Home.

9 Q. Did you have to remove her clothing to
10 conduct your examination?

11 A. No, I did not remove her clothing.
12 That's not in good taste.

13 Q. In terms of the wound itself, did you
14 notice any muscle or cartilage or tendons sticking
15 out at the bottom of the neck where the neck --
16 where the head would have been attached to the neck?

17 A. That's the part I was talking about
18 awhile ago, the protrusion.

19 Q. That I thought you said was at the spine?

20 A. Yeah.

21 Q. Other than that area, anything else?

22 A. No, no.

23 Q. And you mentioned the word "clean".

24 Other than the part which I think you said was the
25 right side was jagged, was the rest fairly smooth --

1 A. Yeah.

2 Q. -- in the edges of her skin, there were
3 the decapitation would have occurred?

4 A. Yeah.

5 Q. You mentioned earlier a decapitation
6 involving, I guess, a train accident in [REDACTED]
7 [REDACTED]?

8 A. Uh-huh.

9 Q. Did you examine that person after the
10 decapitation?

11 A. We embalmed her.

12 Q. Were you able to sew the head back on the
13 body?

14 A. We put the head back on.

15 Q. Can you remember how that head and body
16 differed from what you observed with [REDACTED]?

17 [REDACTED] Object to the relevance,
18 but go ahead.

19 A. Only that in a train wreck her head was
20 torn up quite badly, and, in the case of [REDACTED],
21 it was not. Her face, her head was not torn up.

22 Q. (By [REDACTED] Did you prepare a
23 certificate of death in conjunction with this
24 accident?

25 A. Yes.

Reconstruction Report by

Police Department Officers

[pages 4/11 to 11/11]

SPEED ESTIMATES

ACCIDENT LOCATION: [REDACTED] - STATE OF
DATE: [REDACTED]
VICTIM: [REDACTED]
VEHICLE: 1989 NISSAN SENTRA, RED IN COLOR
1989 GA PLATES [REDACTED]
INVESTIGATED BY [REDACTED] AND [REDACTED]
ACCIDENT SERIES OF EVENTS

[REDACTED] WAS TRAVELING WEST ON [REDACTED] TRAVELING ON
CURVED PORTION OF [REDACTED] VEHICLE WENT INTO A SIDE SLIP WITH
VEHICLE PRODUCING A YAW MARK, WHICH WAS EVIDENT FROM DIAGONAL
STRIATION MARKS LEFT AS V1 SIDE SLIPPED CROSSING DOUBLE YELLOW
LINES CROSSING EAST BOUND TRAFFIC LANE OF [REDACTED] THE YAW MARKS
WERE FAINT BUT PATH OF TRAVEL WAS DETERMINED BY FOLLOWING YAW
MARKS AS TO WHERE V1 FIRST LEFT ROADWAY GOING INTO DITCH. THE
WIDTH OF [REDACTED] IS 18 FEET WITH UNIMPROVED SHOULDERS.

ON THE DATE OF INVESTIGATION WE COULD NOT GET ACCURATE
MEASUREMENTS TO DETERMINE A CHORD AND MIDDLE ORDINATE OF YAW
MARK. THE YAW MARK IS DESCRIBED AS SCUFF MARKS ON DIAGRAM OF
ACCIDENT REPORT BY INVESTIGATING TROOPER. AT TIME OF INITIAL
INVESTIGATION HAD A CHORD AND MIDDLE ORDINATE BEEN DETERMINED THE
EXACT SPEED OF VEHICLE COULD HAVE BEEN DETERMINED.

WE COULD FIND NO REASON TO SHOW WHY VEHICLE TRAVELLED OUT OF
CONTROL OTHER THAN SIDE SLIP PRODUCED BY DRIVER OF VEHICLE.

AS SCUFF MARK CANNOT BE IDENTIFIED AS A SKID MARK SO THIS
MEASUREMENT CANNOT BE USED TO DETERMINE MINIMUM SPEED OF VEHICLE
BY MEASURING THIS AS A SKID MARK ON TRAVELLED ASPHALT SURFACE.

THE OVERALL LENGTH OF THE YAW MARK FROM DOUBLE YELLOW LINES TO
EDGE OF EASTBOUND TRAFFIC LANE WAS 74 FEET 1 INCH. VEHICLE THEN
LEFT ROADWAY TRAVELLING DOWN DITCH WHICH CONSISTED OF GREEN AND
DRY GRASS, ACCORDING TO DRAG FACTOR PUBLISHED IN
(PAGE 15, 90). THE DRAG
FACTOR FOR THIS TYPE OF SURFACE IS .30 - .50.

AS VEHICLE CONTINUED TO TRAVEL DOWN DITCH VEHICLE ROLLED OVER 1
1/2 TIMES WITH WHEELS TRAVELLING ACROSS PARTIAL DRY AND GREEN
GRASS SURFACE, BARE DIRT WITH SMALL ROCKS ON TOP. ALSO AS VEHICLE
WAS ROLLING OVER PARTS OF VEHICLE SHEET METAL WERE IN CONTACT
WITH DIFFERENT TYPE SURFACES: GRASS, PARTIALLY DRY AND GREEN.
BARE DIRT WITH LOOSE ROCKS.

(PAGE 15, DATED [REDACTED] 1990) SHOWS DIFFERENT DRAG
FACTORS FOR DIFFERENT TYPES OF VEHICLE TYPES OF SURFACES. SINCE
THE DIAGRAM IDENTIFIES THE ROADWAY MARKS AS SCUFF MARKS, WHEN NO
ON SCENE MEASUREMENTS WERE MADE, AND THE ROADWAY MARKS WERE FAINT
AND UNABLE TO GET ACCURATE MEASUREMENTS, WE CANNOT USE THIS
DISTANCE OF MEASURED MARKS AS SKIDMARKS. WE WILL USE THE
FOLLOWING RANGE OF ROLLING RESISTANCE FOR THE 74 FEET 1 INCH OF
.02 WHICH GIVES US A RANGE OF MINIMUM SPEED OF 4.73 MPH TO 10.00 MPH
MPH

DRAG CANNOT BE IGNORED

DRAG FACTOR RANGES

DRY GRASS - .30 - .50

TRAVEL - .45 - .70

VEHICLE SLIDING ON ITS TOP OR SIDE .30 - .50

VEHICLE TRAVELLED 146 FEET 10 INCHES FROM EDGE OF ROADWAY ACROSS GRASS SURFACE.

DRAG FACTOR RANGE .30 - .50

MINIMUM SPEED RANGE 36.35 - 46.93

VEHICLE THEN ROLLED OVER WITH SHEET METAL CONTACT TRAVELLING ACROSS GRASS AND DIRT WITH SMALL ROCKS

DRAG FACTOR RANGE .30 - .50

MINIMUM SPEED RANGE IS 24.99 MPH - 32.26 MPH

TOTAL DISTANCE OF ACCIDENT SCENE 290 FEET 82 INCHES.

USING A COMBINED SPEED FORMULA TO DETERMINE MINIMUM SPEED WE GET:

DISTANCES ACROSS DIFFERENT SURFACES

1ST SURFACE	ASPHALT	74 FEET 2 INCHES
2ND SURFACE	GRASS	146 FEET 10 INCHES
3RD SURFACE	DIRT GRAVEL	69 FEET 5 INCHES

RANGE OF MINIMUM SPEED

1ST SURFACE 4.73 MPH - 6.68 MPH

2ND SURFACE 36.35 - 46.93

3RD SURFACE 24.99 - 32.26 $D_f (0.3-0.5)$ **RANGE OF MINIMUM SPEED FOR ACCIDENT VEHICLE****USING RANGE OF DRAG FACTORS**

RANGE OF MINIMUM SPEED FOR ACCIDENT VEHICLE IS 44.36 MPH - 57.33 MPH USING MINIMUM SPEEDS COMBINED

IF WE USE THE FIRST DISTANCE OF 74 FEET 2 INCH AS SKIDMARKS WE WOULD GET A MINIMUM SPEED OF 35.07 - 40-96

COMBINING THIS RANGE OF SPEEDS WITH THE OTHER TWO SPEEDS WE WOULD GET A RANGE OF MINIMUM SPEEDS OF 56.35 MPH - 60.19 MPH FOR ACCIDENT VEHICLE (WRONG WAY). EVEN USING INCORRECTLY IDENTIFIED ROADWAY EVIDENCE AND DRAG FACTORS WE STILL GET A MINIMUM SPEED LOWER THAN THE 75 MPH STATED ON ACCIDENT REPORT. BASED ON THE ACCIDENT SITUATION USING PROPER MEASUREMENTS, IDENTIFYING ROADWAY MARKS, TYPES OF SURFACES THAT VEHICLE TRAVELLED ON THERE IS NO WAY THAT VEHICLE WAS TRAVELLING 75 MPH AS STATED ON ACCIDENT REPORT. THE ONLY WAY 75 MPH CAN BE ASSIGNED TO ACCIDENT VEHICLE IS BY USING .67 DRAG FACTOR FOR THE ENTIRE DISTANCE TRAVELLED BY ACCIDENT VEHICLE. THE ACCIDENT REPORT SHOWS THE ENTIRE ACCIDENT SCENE OF BEING 281 FEET 0 INCHES. WE FOUND ACCIDENT SCENE TO BE 290.82 IN DISTANCE.

VEHICLE EVIDENCE

THE VEHICLE SHOWS EVIDENCE OF SIDE SLIP, ROLLOVER, AND ROTATION. SIDE SLIP IS INDICATED BY STRIATION MARKS ON THE SIDEWALLS OF THE TIRES AND GRASS UNDER THE BEAD, BETWEEN THE TIRE AND RIM. ROLLOVER IS INDICATED BY DAMAGE TO BOTH SIDES AND TOP OF ACCIDENT VEHICLE. ROTATION IS INDICATED BY MULTIDIRECTIONAL SCRATCHES ON THE TOP OF THE VEHICLE.

THE INTERIOR OF THE VEHICLE WAS EXAMINED TO ATTEMPT TO IDENTIFY THE PORTION OF THE VEHICLE THAT CAUSED THE FATAL INJURY. THE ONLY INDICATIONS OF INJURY ON THE INTERIOR OF THE VEHICLE WERE ON THE SHOULDER BELT AND A RUST COLORED STAIN ON THE TOP OF THE REAR SEAT. THE STAIN WAS NOT POSITIVELY IDENTIFIED. DUE TO THE ABSENCE OF BLOOD INSIDE THE VEHICLE IT IS FAIRLY OBVIOUS THAT DECAPITATION AND EJECTION OCCURRED QUICKLY AND WERE VERY CLOSELY SPACED.

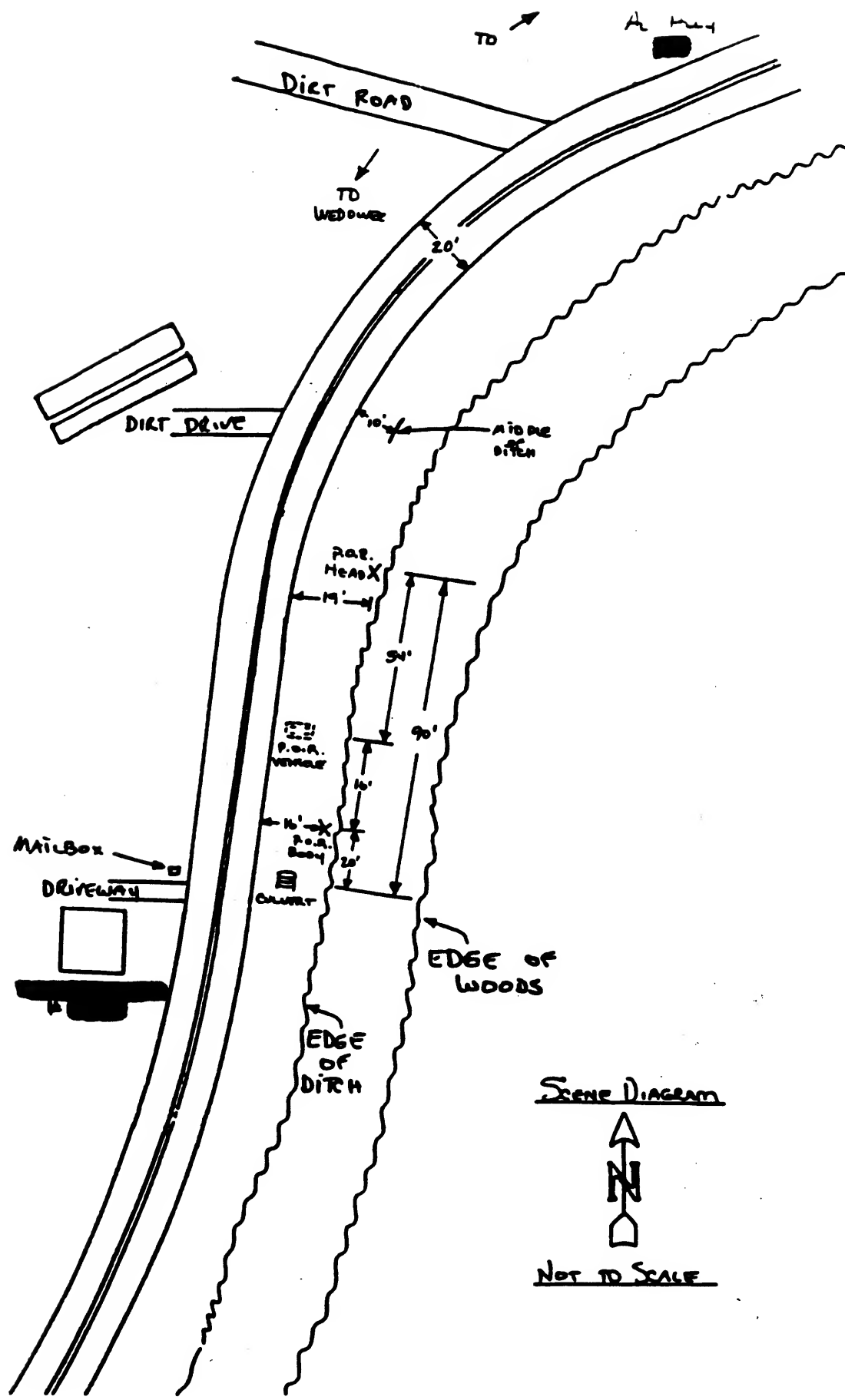
'91 08:54 [REDACTED] RESEARCH CORP

ROADWAY EVIDENCE

THE ROADWAY IS TRAFFIC POLISHED ASPHALT RUNNING BASICALLY EAST-WEST. THE ROADWAY HAS A SLIGHT DOWN-GRADE AND A POSITIVE SUPER ELEVATION. THE SHOULDERS ARE UNIMPROVED WITH A MIN 2 INCH, MAX 6 INCH DROP-OFF. THE ROADWAY IS CURVED TO THE LEFT IN THE DIRECTION OF TRAVEL OF THE ACCIDENT VEHICLE. THE ONLY REMARKABLE ASPECT OF THE ROADWAY IS A FAINT YAW MARK STARTING IN THE WEST BOUND LANE, CROSSING THE CENTER LINE AND EAST BOUND LANE AND LEADING ONTO THE SHOULDER.

THE SHOULDER IS COMPOSED OF EARTH AND GRASS WITH SEVERAL ROCKY AREAS. THE SHOULDER AREA ALSO HAS A SHALLOW DITCH RUNNING PARALLEL WITH THE ROADWAY.

FOLLOWING THE YAW MARK FROM THE ROADWAY ONTO THE SHOULDER THERE WERE TIRE MARKS INDICATING A SIDE SLIP FOR APPROXIMATELY 146.83 FEET. AT THIS POINT DEBRIS IN THE FORM OF BROKEN GLASS FROM THE VEHICLE AND OTHER EVIDENCE INDICATES THAT THE ACCIDENT VEHICLE STARTED ROLLOVER AND ROTATION IN THIS AREA. IT IS ALSO POSSIBLE THAT THE TRAUMA THAT CAUSED DECAPITATION OCCURRED IN THIS AREA. THE VICTIM'S HEAD WAS MARKED AS COMING TO REST APPROXIMATELY 69.41 FEET FROM THIS AREA. THE VEHICLE PROCEEDED ANOTHER 45.50 FEET COMING TO REST ON ITS TOP. THE VICTIM'S BODY'S FINAL REST IS 20.58 FEET FROM VEHICLE.



SCENE DIAGRAM

↑
N
↓

NOT TO SCALE

'91 08:56 [REDACTED] RESEARCH CORP

P.9/11

CONCLUSIONS

IT IS OUR OPINION THAT A ONE CAR ACCIDENT OCCURRED AS INDICATED BY THE ACCIDENT REPORT AND THAT AS A RESULT A FATAL INJURY WAS SUSTAINED.

A 1989 NISSAN SENTRA WAS WESTBOUND ON ROUTE [REDACTED] AND WAS OPERATED BY [REDACTED]. THAT WHILE NEGOTIATING A CURVE AND FOR REASONS UNKNOWN A VIOLENT STEERING MANEUVER WAS PERFORMED CAUSING THE VEHICLE TO EXCEED THE CRITICAL SPEED OF ITS OWN PATH OF TRAVEL AND GOING INTO SIDE SLIP. THE VEHICLE LEFT THE ROADWAY SIDE SLIPPING ALONG THE SHOULDER AND GENERALLY FOLLOWING THE DITCH. THE VEHICLE'S TIRES DUG IN CAUSING A PLOWING EFFECT TRIPPING THE VEHICLE. THE VEHICLE ROLLED OVER APPROXIMATELY 1 1/2 TIMES. DURING ROLLOVER AND DUE TO THE CONTOUR OF THE DITCH THE VEHICLE ALSO ROTATED. DURING THIS TIME THE DRIVER WAS DECAPITATED BY THE SHOULDER BELT, THE HEAD AND BODY BEING EJECTED THROUGH THE REAR WINDSHIELD. THE BODY, HEAD AND VEHICLE CAME TO UNCONTROLLED REST IN SEPARATE AREAS.

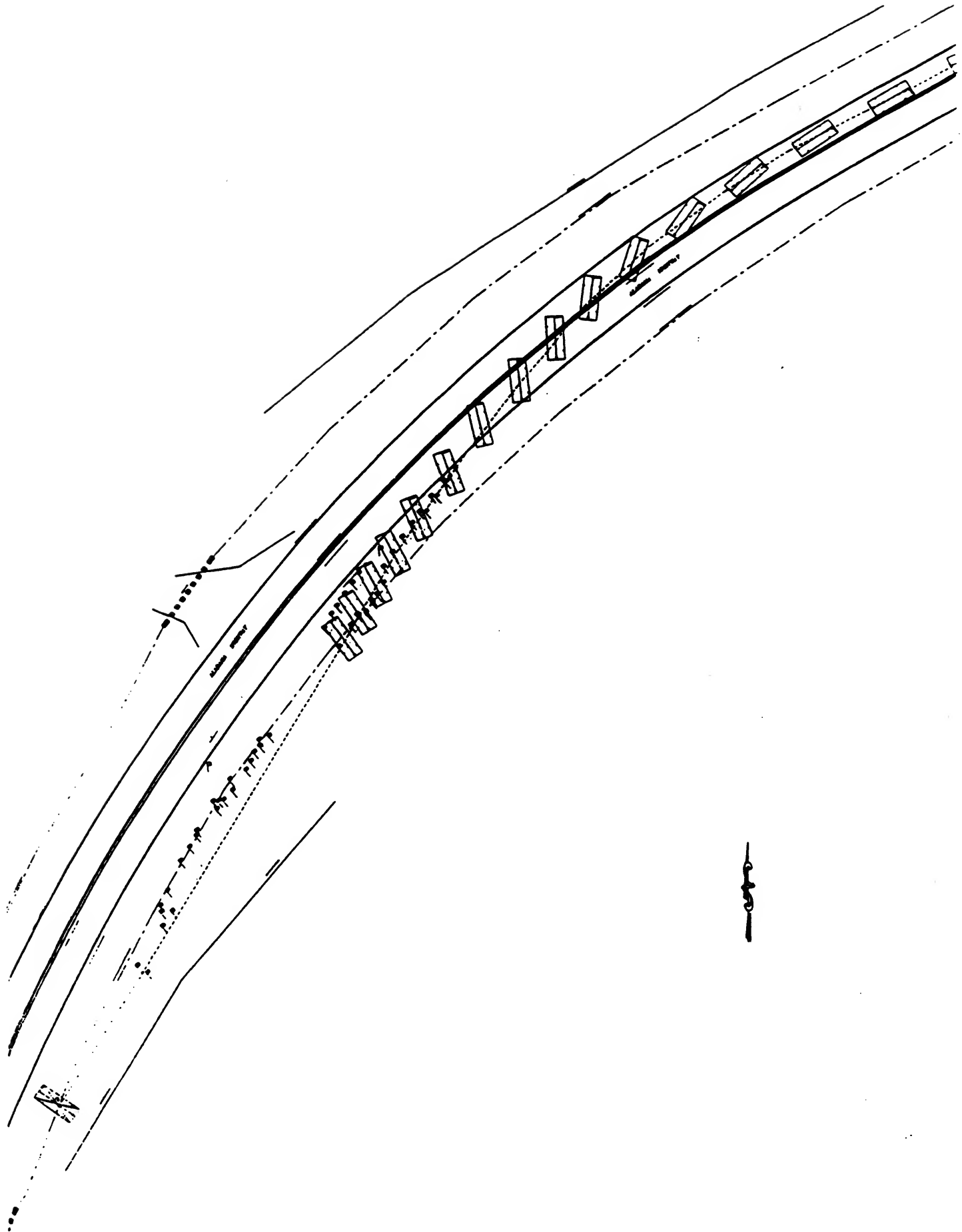
THE VEHICLE'S SPEED AT THE TIME IT LEFT THE ROADWAY CAN BEST BE STATED AS A RANGE OF SPEED. THE SLOWEST THE VEHICLE COULD HAVE BEEN TRAVELLING TO COVER THE ACCIDENT SCENE IS 44.36 MPH. THE FASTEST THE VEHICLE COULD HAVE BEEN TRAVELLING AND STAYED IN THE ACCIDENT SCENE IS 57.33 MPH. WE BELIEVE THE UPPER LIMITS TO BE CLOSER TO THE TRUE SPEED OF THE VEHICLE.

'91 08:57 [REDACTED] RESEARCH CORP

P.11/11

THE MINIMUM SPEED FOR VEHICLE CAN ONLY BE IN A RANGE OF 44.36 MPH - 57.33 MPH. THERE IS NO AVAILABLE ROADWAY MARKS OR NO OTHER PHYSICAL EVIDENCE THAT COULD BE USED TO PROVE A 75 MPH. BASED ON OUR INVESTIGATION WE WILL ASSIGN A MINIMUM SPEED RANGE FOR ACCIDENT VEHICLE TO BE 44.36 MPH - 57.33 MPH. THERE WAS NO EXCESSIVE SPEED INVOLVED IN THIS FATALITY ACCIDENT.

Tire and Debris Locations



Accident Site Inspection ①

1952

ACC SITE INSPECTION

UNSSA2

LOG OF FLAG NUMBERS AT SCENE

#1 thru #9 TIRE PATH (LF)

#10 - #19 TIRE PATH (RF)

#20 - #26 TIRE PATH (RR)

Sample taken at each following flag.

✓ #27 - FIRST GLASS ENCOUNTERED .136 thick
tinted.

#27A Rear HARA GLASS - .154 thick, defogger
grid present.

#(28) GLASS - ~2' circle area .137 tinted

#29 - Glass - Concentrated area ^{.137} total
 Plus first sample at .201 - Painted
 with grid over it.

*30 - Glass particles - .135 tint;
 .201 painted grid; .157 w oil based red
 paint. - First of rear hatch.

#31 - Glass - .135 tint, .157 paint,
 .201 paint.

32 - Glass - .135 tint, .135 Paint
 .201 painted grid. * First from side
 of master glass.

#33 GLASS - Mostly .201 Painted
grid, little .137 tinted.

#34 GLASS - MOSTLY .201 Painted
grid; some of 57 Refs grid, little
.137 tinted.

#35, Glass, .201 Paint grid; .157 Refs
.137 Black Paint tint; .137 tinted.
+ BLACK PLASTIC PART - (Brown CLIP?)

#36 GLASS - .136 tint, .137 BCK PART,
.155 PAINT, .201 Paint grid.

#37, GLASS - .136 tint, .157 ^{Refs} GRID,
.201 Paint grid.

(a)

#38. - GLASS - .152 painted, .157
tinted, .137 tint, .201 Paint Grid.


#39. GLASS - .201 Paint grid, .137 tint,
.157 PAINT Bk - EDGE.

#40. - Glass - .201 Paint grid; .156 ^{Bk} Paint
.138 tint g -

#41 GLASS - .156 PAINT Bk, .156 Tint,
.136 TINT; LITTLE .20 GEOPRINT
(Last of .201 Glass.)

#42 GRAY PLASTIC PART - FRACTURED.
+ .11100 .137 TINT GLS -

43 GLASS - .156 g total; .137 g total
LAST GLASS FOUND

43A BLACK PLASTIC LOW POWER - broken,
has  pattern on one side

44 - Gray plastic part broken like 42

45, 46 INDENTATION ON GROUND -

Now has 2 pieces of broken gray plastic
plus orange/red reflector/disk - plastic.
took small broken sample of orange lam.

Also AT 45, 46 - glass fragment -
thin, painted black on side, sealed along
one edge - was found between
flag 45, 46 about 2' west or toward
the culvert.


47. Approximate location of vehicle at rest

Note: In 1991 site inspection, Spence subjects - one door left handle - sofa
chair door - essentially close to flag 3b
another digit was a plastic piece with
tapered glass in a groove. This was
originally found near parent flag 33.

[REDACTED]

[REDACTED]

[REDACTED]

 NISSAN 1989 Sentra Se Gape
GLASS THICKNESS $\left(\frac{25.9 \text{ mm}}{1 \text{ in}} \right)$

WINDSHIELD - 4.7 mm = .185

Door Window - 3.5 mm = .138

Rear Side Quarter Glass 3.5 mm = .138

HATCH BACK GLASS 4.0 mm = .1575

SUN ROOF GLASS 4.7 mm = .185

O/A 2-5-90

LAMINATED W/S 4.7 mm

Speed Calculations

██████████ (██████████) Nissan

MPH notes

Survey Distance

Trip point to Point just on roof 176 ft.

Yaw on shoulder to Trip point 74 ft

Yaw marks on pavement visible 74' (██████████)
MPH estimate - yaw activity $\approx 125'$

Speed values.

Pollower - Trip to rest $\therefore S = 176'$

Decel values .. 40 - 60 typical soil

$$U^2 = 30 \& 5$$

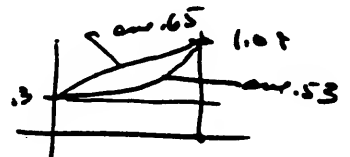
$$U^2 = 30 \times .4 \times 176$$

$$U^2 = 2112 \checkmark \quad \text{to } 3168 \checkmark$$

$$U = 46.0 \checkmark \quad \text{to } 56.3 \checkmark$$

Yaw on dirt/grass/gravel shoulder 74 ft

Use range decel .50 - 1.65, *fair*



$$U^2 = U^2 + 30 \& 5$$

$$U^2 = (2112 \text{ to } 3168) + 30 \times .5 \times 74$$

$$U^2 = (2112 \text{ to } 3168) + 1110 \quad \text{to } 1403$$

$$U^2 = 3222 \text{ to } 4611 \checkmark$$

$$U = 56.8 \checkmark \text{ to } 67.9 \text{ mph}$$

Yaw marks on Pavement

A. Visible Marks - 74' (per [redacted])

Decel range .2 to .3

wrong! don't know reason for yaw, could be accelerating

$$U^2 = U^2 + 30 f S$$

$$U^2 = (3222 \text{ to } 4611) + (30 \times .2 \times 74)$$

$$U^2 = (3222 \text{ to } 4611) + (444 \text{ to } 666)$$

$$U^2 = 3666 \text{ to } 5277$$

$$U = 60.5 \text{ to } 72.6 \text{ mph}$$

B. Alternatively - visible marks + expected yaw activity prior from right shoulder area

$$S = 125' \quad f = .15 \text{ to } .30$$

$$U^2 = U^2 + 30 f S$$

$$U^2 = (3222 \text{ to } 4611) + (562.5 \text{ to } 1125)$$

$$U^2 = 3784 \text{ to } 5736$$

$$U = 61.5 \text{ mph to } 75.7 \text{ mph}$$

Roll over dist curve - 176' - theoretically enough for 5+ rolls.

$\frac{1}{2}$

First $\frac{1}{2}$ roll trip to top down approx 45' leaving 131' to rest

Distance would allow for 2 to 4 more rolls.

$2\frac{1}{2}$

Indentation is approx 80' further - leaves 50' to rest

Indentation is roof down, 2 rolls likely.

↳ down hill @ 36)

Rest point approx 50' to roof down

$3\frac{1}{2}$

assume 1 more roll to rest

Conclusion Most probable $3\frac{1}{2}$ rolls.

(enough distance for $4\frac{1}{2}$ rolls but less likely)

Scene Inspection

1991

Hwy [redacted]

Site of rollover crash - [redacted]

U Nissan

Located site per Police report
2 lane asphalt. Nissan Travelling
in left curve, slight downhill.
leaves road to left, roll 281 ft
stops about 36 ft from culvert.

Rollover area is a roadside
shoulder area with a drainage ditch
approx 2' below pavement. Pitch
is fairly overgrown with weeds today
there are a few clear spots, but mostly
grass, weeds, small trees.

At area off in locater wellown
begins, 281' to Por. Walled ditch
area. Find some broken Tempered glass,
some tinted, some with black seal edges

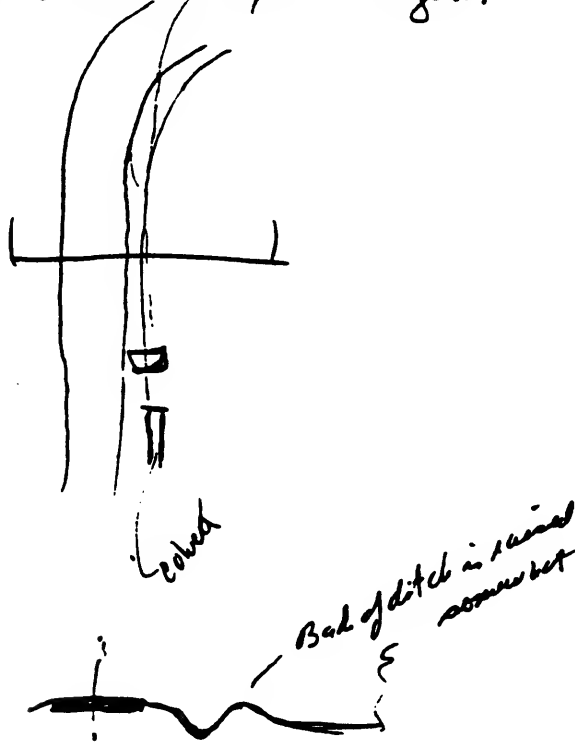
- ① — Also find a plastic component that
holds tempered glass.
- ② — Find a plastic component that looks
like a left handle.

Because of overgrown weeds, ~~it is not~~
able to detail all components or glass
areas at this time.

Location of items 1 & 2 based on culvert
about 36' past exit point of car.

- ① 171' up from culvert 57
- ② 156' up from culvert 52

Annual photo taken of area
Hwy is open - 55 mph limit.
Acc begins in a left turn. Followon
covers 281' in slight downgrade.
Ditch shape will have tendency
to hold vehicle along its length.



Vehicle Inspection

Cut portion of belt examined
from bag marked plaintiff's exhibit 7

41
Also dated 41 with identifying
number [REDACTED]

Belt ^{27 1/2} 27" from plastic face of latch
plate to cut end

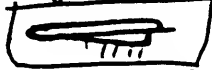
Belt has clay type residue on
"in" side at stitch area and
12-13" from plastic face of latch
plate. 12-13 area is also on abrasion
area - top of belt

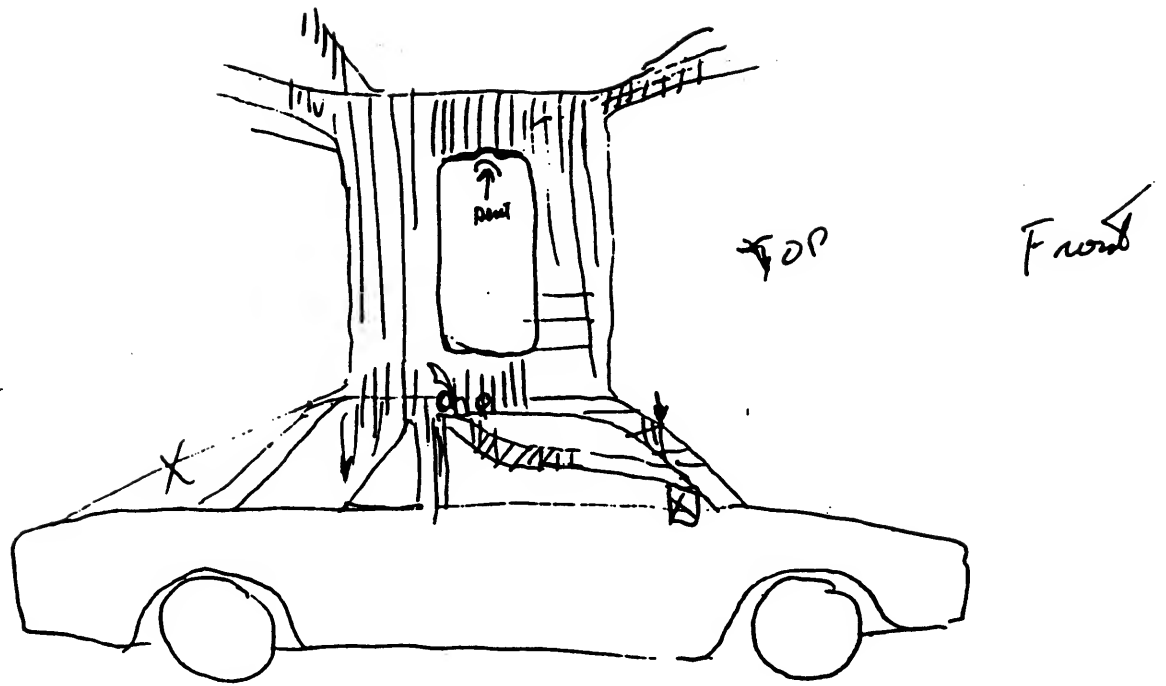
On outside, abrasion on 'top' at
5 to 6" from reference ^{face} and at 8 1/2".

Bumper knocked off at bracket by
impact at left end directed to the
right. Both mounting brackets deformed
torn and split. Left end of bumper deformed &
corner marked. Frontal overview shows
substantial left front ground contact
deforming front structure left to
right, & pressing down on hood/fender.
LF Suspension appears deformed

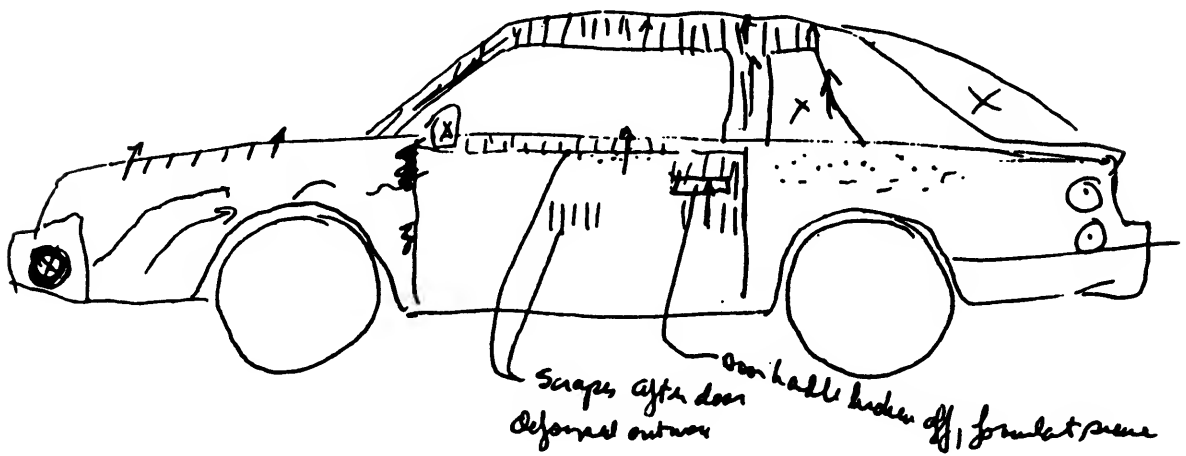
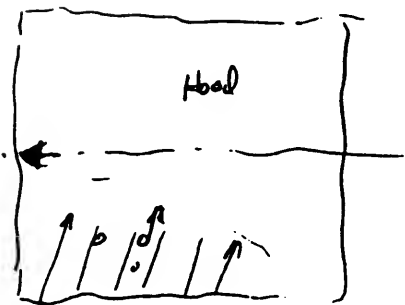
Steering is generally small amount right,
strong cal lock, Ignition key gone.

Interior observation .

- Driver seatback deformed to the left.
- No marks on Dr Seat belt.
- Dr Shoulder belt - marks on belt fabric 12" below cut. Groove in retracta guide, ^{smear} smear from belt fabric. Groove distorted at rear. 
- Dr Door deformed outward from inside loading. (fx sill plastic)
- Sunroof flange is locally dented by object moving right to left in opening with sunroof out. Remove gasket to see.
- Dr Door sill appears deformed at 2 points (essentially by driver shoulder) 1 further forward.
- no apparent structural bending.
- Unable to unlatch or open either door



RIGHT SIDE



91

Red NISSAN COUPE SEXTA SE
[REDACTED] NISSAN HATCHBACK
[REDACTED]

Followed Collision - DAMAGED ALLOY

ALL GLASS BROKEN, FRONT BUMPER OFF
BOTH MIRRORS OFF, MISSING - LAR INTERIOR
Trim for Apilla and side loaden. *Requested, but not there*
SCARF PATTERNS - MULTIPLE DIRECTIONS
Some rolling on grassy surfaces

DRIVER'S SHOULDER belt OFFER PORTION CUTOFF,
separately available in plastic bag.

Tires - BRIDGESTONE POTENZA
185/60 R 14 Tubular SBR
MAX LOAD 1050 at 32 PSI
ON NISSAN ALUMINUM WHEELS

Tread wear - Cars - $\frac{1}{8}$ - $\frac{3}{16}$ Tread depth
Fronts - Tread wear indicators visible
only grooves.
R.F. Low pressure CF Low
Rear appears.

LF wheel - ^{circumferential} abrasion on rim flange
from about 7:00 thru 12 to about 2:00
Dirt & Grass in head seat from
around 8:00 to ~11:00
And from ~1:30 - 4:30
Surface abrasion on wheel surface
induced from flange 9:30 - 10:30

LR wheel - no scrapes or abrasions

no head seat interruption

RR wheel - ^(circumferential) scrape on rim flange
~~RR wheel~~ from 8:00 - 9:00

Grass in head seat around essentially
whole perimeter except for small spots
open from 12-1 and 7-8:00 where grass
is not seen.

RF wheel

One lateral rim flange scrape
at 7:00, Grass in head
seat from 5:00 to 8:00
Dirt in head 11:00 - 2:00

Interview with _____ Police Department Sergeant

[REDACTED] INTERVIEW

TL: This is [REDACTED] 1991. We are on the premises of the Police Department. I am talking to [REDACTED] Sergeant, Police Department, 2:44 p.m., [REDACTED] afternoon, Eastern Standard Time. I am taping this recording with [REDACTED] full knowledge and understanding. Is that correct?

CA: Yes.

TL: Okay. And do I have your permission to tape this recording, do I have your permission?

CA: Yes, yes.

TL: Will you state your full name.

CA: [REDACTED].

TL: And what is your home address?

CA: [REDACTED]

TL: Okay. And what is your occupation?

CA: I work for the [REDACTED] Police Department as Sergeant.

TL: Okay. [REDACTED] how long have you been working with law enforcement?

CA: [REDACTED] of 91 will be 6 years.

TL: Okay, and did you have a chance to see a wrecked automobile that was located at [REDACTED] that belonged to a [REDACTED]

CA: Yes, it was at [REDACTED]

TL: [REDACTED] okay, and when did you look at that car.

CA: It was about 3 days after the wreck happened.

TL: Okay, it was about 3 days after the accident occurred? Uh, [REDACTED] what did you observe when you looked at that car?

CA: Well, I looked at the top and the sides and the insides of it and the seatbelt had meat still hanging on it.

TL: Okay, and what part of the seatbelt?

CA: It was the upper part of it.

CA: It was the shoulder harness.

TL: The shoulder harness? Okay, and so I guess after 6 years in the Law Enforcement you've seen enough accidents to know when your're looking at flesh and blood in an automobile.

CA: Oh yes!

TL: Okay, is there anything else you noticed about it.

CA: The way it was hit on the left side, the way it was turned. I mean you look at all, it was just hit on one side, the right side didn't have no damage done to it at all.

TL: Okay. Did it appear it had been rolled over?

CA: It's been rolled over.

TL: Okay, and did you stop and see where the accident occurred on the highway?

CA: Yes.

TL: And was there anything there that was outstanding or that you saw?

CA: Well the way the tire marks were was another thing I noticed on it. It looked like it slid sideways for awhile and then straightened back way.

TL: Was there any gouges or anything?

CA: No, it never did even leave the road, that's another thing I never understood.

TL: It never left the road?

CA: Never left the road, not the side of the road or nothing.

TL: So the accident occurred on the roadway.

CA: It started on the road. It left the road.

TL: Okay. Alright [REDACTED], is there anything else you'd like to say at this time?

CA: That about takes care of it. That's all of it.

TL: Okay. That concludes this interview with [REDACTED] It is now 2:49 on [REDACTED] 1991.

Signature

WITNESS

Interview with Wrecker Service/Tow Facility Owner

[REDACTED] INTERVIEW

GPW: Okay, this is [REDACTED] 1991, and we are at the premises of [REDACTED] Wrecker Service, and I'm talking to [REDACTED]. It's 3:00 in the afternoon, Central Standard Time, and I'd just like for you, [REDACTED] to realize I am tape recording this, and am I tape recording this with your full knowledge and understanding?

BH: Yes, sir.

GPW: Okay, and do I have your permission to tape record it?

BH: Yes, sir.

GPW: Okay. Would you state your name for me?

BH: [REDACTED]

GPW: And what is your home address?

BH: [REDACTED]

GPW: And what's your occupation?

BH: Wrecker. . .I own a wrecker service and body shop.

GPW: Okay, now [REDACTED] how long have you been in the wrecker business?

BH: Oh, approximately thirty years.

GPW: Okay, as a wrecker driver, have you had the opportunity to haul in cars that have been in wrecks?

BH: All kinds.

GPW: And how many would you say in thirty years you've hauled in?

BH: Got no idea.

GPW: Would it be over a thousand?

BH: Yes, sir.

GPW: Probably be over five thousand?

BH: Be. . .be between.

██████████ INTERVIEW

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GPW: Okay, in that thirty years, have you had an opportunity to look at the cars that have been in wrecks, and basically try to either repair them or see what kind of damage was done to them?

BH: Yeah, nearly all of them.

GPW: In doing that, have you had any opportunity to see what was flesh and blood, or both that came from the wrecks?

BH: Yes, sir.

GPW: How many occasions would you say you've had opportunity to see human flesh or human blood from wrecks?

BH: Probably seventy percent of what I pull in.

GPW: Okay, do you recognize flesh and blood when you see it?

BH: Yes, sir.

GPW: Now I want to call your attention back to ██████████ of 1990. Did you have an occasion to work a wreck that involved a twenty-one year old black female by the name of ██████████ that was driving a Nissan that rolled over causing decapitation?

BH: Yes, sir.

GPW: Okay, how do you remember that case?

BH: Well, she left the road, came down a little ditch and came up. The car went over, and the first time it went over, the best I remember, it left her head laying there on the ground. And the car rolled several more times, and the last time it rolled, her body was laying out on the right side below the car.

GPW: Okay, now how long had the wreck been there when you got there?

BH: Approximately thirty, forty minutes.

GPW: Okay, and when you got there, was the body still there?

BH: Yes, sir.

GPW: Okay, and had they moved anything when you got there?

BH: No, sir.

██████████ INTERVIEW

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GPW: Uh, did you have an opportunity to examine the car on that particular day?

BH: Um. . .the next day.

GPW: Okay, and uh. . .

BH: It was at night when the wreck happened, late, and we examined it the next day.

GPW: Okay. And in your examination, did you attempt to look and determine what had decapitated this young lady?

BH: Yes, sir.

GPW: And what did you find when you looked at the car?

BH: It was the shoulder strap because it still had flesh and blood in it.

GPW: And where on the shoulder strap was the flesh and blood?

BH: Right at the top.

GPW: Okay, and what kind of shoulder strap was this, do you remember?

BH: It was the one that just went across from the spaces of one side of the car over to the top side, goes across your chest.

GPW: Okay, do you know whether. . .

BH: Right across your neck if you're a short person.

GPW: Do you know whether or not she had her lap belt on?

BH: No, sir. It wasn't on.

GPW: Okay.

BH: She never wore her lap belt. All of her friends said.

GPW: Okay.

BH: Just a shoulder strap.

GPW: And did you find any evidence that she had worn her lap belt in this case?

BH: No, sir. It was untouched. No stress in it nowhere.

INTERVIEW

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GPW: Okay, now, does the lap belt leave, in a wreck, or does the seat leave some stress indications when they've been in a wreck, usually?

BH: On a real hard impact. . .

GPW: Okay. . .

BH: It will leave some stress.

GPW: Was there any stress on this belt?

BH: Not on the lap strap, there was on the shoulder strap.

GPW: Now, uh, what did the inside of the car look like, as far as blood was concerned?

BH: Didn't see no blood.

GPW: Okay, where is the only place you saw either flesh or blood?

BH: Just on the belt, up at the top side.

GPW: And when you saw this, uh, had anything disturbed the inside of the car, other than the investigation by the trooper, had there been anything else to disturb the inside of the car?

BH: No, sir, none whatsoever. It was impounded.

GPW: Okay.

BH: It was inside the fence.

GPW: Okay, that's in your place, at your wrecker service?

BH: Yes, sir.

GPW: Okay, now, uh, I came out to see you several weeks later. Do you remember that?

BH: Yes, sir.

GPW: Now, do you remember what the weather conditions had been like before I came out?

BH: It was damp, rainy.

GPW: Okay, had the car window, door been broken out so that it was difficult to cover up the seat belt?

[REDACTED] INTERVIEW

Page 5

BH: Yes, sir, it was, windows was out, we had it covered, the wind kept blowing the cover off. It would rain, we'd cover it back.

GPW: Now, uh, is there a possibility that that flesh and blood got washed off while sitting in the. . .

BH: A great possibility.

GPW: Okay, but in your mind, was there any doubt as to what you saw that next morning, that that was flesh and blood on that seat belt?

BH: It was definitely flesh and blood.

GPW: Okay. Now the first day I talked to you, did you tell me this same thing?

BH: Yes, sir.

GPW: And that was almost a year ago, right?

BH: Yes, sir.

GPW: In fact, would it be fair to say that you're the one that alerted me, or alerted the family that the seat belt, in your opinion, was what had caused the death?

BH: Yes, sir.

GPW: And uh, do you have any axe to grind in this case? Uh, do you, uh, are you a member of the family?

BH: No, sir.

GPW: Okay, and are you employed by anybody, uh, that's involved in this case?

BH: No, sir.

GPW: You're just an independent witness?

BH: Independent witn. . .witness.

GPW: Okay, anything else, uh, that you want to say about the wreck that I haven't already asked you?

BH: That basically covers it, uh, you know, I just think you covered it all, I guess.

[REDACTED] INTERVIEW

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GPW: Okay. Did anybody else go out on the wreck with you to work it?

BH: My two boys went with me.

GPW: What are their names?

BH: **[REDACTED]** and **[REDACTED]**.

GPW: Okay, and would they have also had an opportunity to see the seat belt with the flesh and blood on it?

BH: Yes, sir. They saw it, too.

GPW: And, are they present here, today, where we can talk to them?

BH: Yes, sir. They work for me.

GPW: And how long have they been working for you?

BH: Uh, ever since they been big enough. One's sixteen and one's eighteen.

GPW: Okay. So, they've been working for you as long as they've been old enough to work, huh?

BH: Old enough to mess up.

GPW: Anything else you want to say?

BH: Nah, I guess that about covers it there.

GPW: Okay.

I'm going to cut the tape off then. It is, I've got seven minutes after three, Central Standard Time. I'm going to cut the tape off.

Witness / **[REDACTED]**

Summary of Plaintiff's Exhibits

██████████ is the father of ██████████ v. Nissan

File Contents

1. Police Report
2. Medical Reports:
 - Coroner's Report
 - Death Certificate
3. Letters from ██████████ to ██████████ Companies re. insurance.
4. Memo of ██████████ visit to ██████████ Body Shop, Coroner's Office and the Sheriff's Office.
5. Interview (witness statements):
 - ██████████
 - ██████████
 - ██████████
6. Reconstruction Report by ██████████
7. Photolog of ██████████
8. Crime Lab Report
9. Complaint
10. Plaintiff's First Joint Interrogatories to Defendant
11. Notice to Proceed before a United States Magistrate.
12. Instructions regarding pretrial proceedings
13. ATLA material including page from owners manual.
14. Paper: ██████████ 90
15. Paper: ██████████
16. Paper: ██████████ 1969
17. Paper: ██████████ 1990
18. Paper: ██████████ 1990 - NHTSA, ODPR
19. Newspaper Article: ██████████ 1991 - NHTSA, ODPR

Police Report

Date: 90, 7:00 PM Vehicle #1: 1989 Nissan Sentra 2D
 Conditions: Dark-road not lit, dry, clear VIN: JN1GB24P8K4██████████
 Roadway: Curve-down grade, asphalt Driver: ██████████ 21yr

Vehicle #1 was traveling west on ██████████ apparently at a high rate of speed. It appeared that she misjudged curve and went out of control. Vehicle ran off road, into a ditch and apparently turned over several times before coming to rest upside down. Estimated speed is 75 mph. Lap and shoulder belt used.

Medical Reports:

Coroner's Report

Victim decapitated in rollover accident. Instant death. Left femur fractured.

Certificate of Death

Decapitation. Approximate interval between onset and death: seconds.

Dr. ██████████ was retained by ██████████ to analyze the material in a plastic bag. The bag contains a seat belt cut from the driver's side of the vehicle and material scraped into the bag which is believed to be human flesh. He would also like the blood type, if possible. This is an attempt to support the conclusions drawn in the ██████████ report that the decapitation was caused by the seat belt. Both the coroner and the funeral director commented that the cut was the cleanest cut they had ever seen, starting at the base of the neck and going almost straight across. ██████████ understands that this is consistent with a nylon cut, being very clean. Dr. ██████████'s report is not included in the file sent to ██████████.

Memo of [REDACTED]'s Visit: He went with [REDACTED] grandmother of [REDACTED] to [REDACTED] Body Shop where they met [REDACTED]. Took photographs at the scene. Mr. [REDACTED] pointed to a spot on the underneath side of the seat belt on the driver's side where it had been bloody and fleshy when the car came in. The top side of the belt didn't show much because they had had about two weeks of rain and the plastic cover over the car hadn't kept the rain out. He took the seat belt loose and took photographs of the underside of the belt. He took the flesh specimen with a knife and put the specimen and the knife into a plastic bag. Later he cut the seat belt off and put it into the same bag.

He then went to the Coroner's office. The Coroner, [REDACTED], said it was a very clean cut and theorized that the cut came from the metal on the body of the car. [REDACTED] also runs a funeral home.

He talked to Sheriff [REDACTED] who gave them the name of the State Trooper that wrote the accident report in this case. His name was [REDACTED]. Trooper [REDACTED] was not home.

They went back to [REDACTED] Body shop. [REDACTED] pointed out that there was no blood anywhere except on the driver's door and that the driver's door was pooched out where it appeared that the body had come out the window. He had previously determined that the window was most likely rolled up at the time of the accident. There were no sharp parts on the door. He felt that only the seat belt could have cut off the head in that manner. He said that the seat belt was extremely tight when he pulled the car in.

[REDACTED] then went to the [REDACTED] Police Department where he talked to [REDACTED] and [REDACTED]. They felt it was very possible that the seat belt had caused this kind of injury and said they would get permission from their superiors to work on the case.

Next, he called [REDACTED] at the Funeral Home to verify that there were no scratches or serious marks on the face of [REDACTED] or anywhere else, that her major injuries were the broken femur and the decapitation, that her face had only a few slight marks but nothing you would expect from a road mark or a scrape on the road. [REDACTED] described the decapitation as extremely clean cut, the cleanest cut he had ever seen; like a metal cutter. [REDACTED] said the cut was right at the base of the neck and straight across; just like it was chopped off in a guillotine.

Interview of [REDACTED]:

He owns the wrecker service and body shop that towed [REDACTED] car. He remembers the accident. He believes the car rolled over the first time and left her head lying on the ground. The car rolled several more times and the last time it rolled her body was lying out on the right side below the car. He got there about 30 - 40 minutes after the accident. They hadn't moved anything when he got there. He looked at the car the next day and found that the shoulder strap had decapitated her. The shoulder strap still had flesh and blood at the top of the strap. She wasn't wearing her lap belt. There wasn't any stress on the lap belt, there was on the shoulder belt. Nothing had been disturbed in the car when he saw it, it had been impounded. When [REDACTED] came out several weeks later, the rain had come in through the broken windows and washed off the flesh and blood from the shoulder belt. [REDACTED] was the one who alerted the family that the belt was the cause of death in his opinion. His two boys, [REDACTED] and [REDACTED], went out to the wreck with him. They are sixteen and eighteen years old.

Interview of [REDACTED]:

He went out to the wreck with his father. The head had been removed from the body with a very clean cut at the base of the neck, right at the top of the shoulders. It was basically straight across. He didn't look closely at the car the next day so he didn't see if there was flesh and blood on the seat belt.

Interview of [REDACTED]:

He is a Sgt. with the [REDACTED] PD. He looked at the car at [REDACTED] about 3 days after the wreck; at the top, the sides, the inside, and the seatbelt. The upper part of the seatbelt had meat still hanging on it. He knew it was flesh and blood from his 6 years of experience.

He noticed the way the car was hit on just on the left side; the right side didn't have any damage to it at all. It had rolled over.

He also looked at the site and noticed from the tire marks, that it looked like it slid sideways for a while and then straightened back up. There were no gouges that he saw.

Interview with [REDACTED]:

He saw [REDACTED] laying just on the edge of the road on the bank and the car was about 10 ft. away from her. He feels the top of the car went down and struck something on the ground; her head was about 18" from that spot.

Interview with [REDACTED]:

He is a Deputy Sheriff and responded to the accident. When he got there, the car was sitting upright. It looked like it had left the roadway in a curve and tumbled at least 2 or 3 times. He didn't investigate the scene too closely because a trooper was on the way but it definitely had rolled.

The body was already out of the car, some distance from the car, he estimates 2-3 car lengths, and was decapitated. Someone had already recovered the head and covered the body with a sheet so he thinks the ambulance was already there.

The curve in the road was not a real bad curve but it lays kind of flat without a whole lot of bank to it.

As far as he remembers, there was a large amount of blood on the driver's door. He didn't notice that much blood inside the car itself. He assumed that the decapitation was probably from the turning of the car, possibly the window was down and her head moved out and was decapitated that way. He really doesn't have an opinion.

Reconstruction by [REDACTED] and [REDACTED]

Police Department

Roadway was traffic polished asphalt running slightly down grade with a positive superelevation, unimproved shoulders with 2-6" drop-offs, and a curve to the left in the direction of travel of the vehicle. A faint yaw mark starting in the WB lane was found which crosses the center line, the EB lane, and leads onto the shoulder. The shoulder is earth and grass with rocky bares sopts and a shallow ditch. There was a 146.8 ft yaw mark on the shoulder indicating side slip at the end of which was broken glass from the vehicle. The glass and other debris indicate that this is the point at which the vehicle started to roll. The victim's head came to rest 69.4 ft from this area while the vehicle proceeded another 45.5 ft coming to rest on its top. The victim's final rest was 20.6 ft from the car.

Vehicle interior was examined to attempt to identify the portion of the vehicle that caused the fatal injury. The only indications of injury on the interior of the vehicle were on the shoulder belt and an unidentified rust colored stain on the top of the rear seat. Due to the absence of blood inside the vehicle it is fairly obvious that decapitation and ejection occurred quickly and were very closely spaced.

Conclusion: "While negotiating a curve and for reasons unknown a violent steering maneuver was performed causing the vehicle to exceed the critical speed of its own path of travel and going into side slip. The vehicle left the roadway side slipping along the shoulder and generally following the ditch. The vehicle's tires dug in causing a plowing effect tripping the vehicle. The vehicle rolled over approximately 1 1/2 times. During rollover and due to the contour of the ditch the vehicle also rotated. During this time the driver was decapitated by the shoulder belt, the head and body being ejected through the rear windshield. The body, head and vehicle came to uncontrolled rest in separate areas."

Conclusions: The minimum speed that the vehicle can only be in a range of 44.4 mph to 57.3 mph. There was no excessive speed involved in this fatality accident.

Interview with [REDACTED]

[REDACTED] was following him on the highway to his house. He had been running pretty fast, over the speed limit, and had slowed down but figures she was still running pretty fast. Her car lights went around the curve and she left the road somehow and the car started flipping. He doesn't have any idea of how fast she was really going. He turned around and went back and found her body and went back to his car.

Interview with [REDACTED]

He is a paramedic and responded to the accident. When they got to the scene, there was a gentleman standing there. The car kind of went off the right side of the road in a ditch as you go east. The gentleman had already covered the body and told them that she had been decapitated. They checked the body and found there was nothing they could do so they started searching for the head and any other objects that might have been in the car.

The body was outside the car, probably 6-7 ft. due west from the car, just on the other side of the car. They looked for the head in the ditch, under the car, inside the car and then started up the road. They could tell the car had come a considerable distance because there were clothes, papers, and other stuff strewn all down the ditch. This same gentleman eventually found the head about 40-50 yards due east of the car.

The decapitation was a real clean type of cut. The head was fairly intact; he didn't see that much damage to it. Since there was a decapitation, they didn't examine the body.

There was nothing that he knows of that indicated what might have caused the decapitation. The car was torn up, totaled. It looked like it had turned over in the ditch, slid down in the ditch and ended up on its top from what he remembers. He doesn't remember any blood or flesh in the car; it was dark.

He was told that her boyfriend had been following her before the accident. He left when they got there.

Interview of [REDACTED]

He heard about the accident on his scanner and drove over to it. The body was covered up in one place and the head was covered in another place. It looked like she was driving too fast, trying to keep up with some boy. He thinks they were just flying. It's a bad curve and a lot of people don't realize how bad it is; there are a lot of wrecks there.

Interview with Trooper [REDACTED]

He arrived and found a car off the road, sitting upright, that had been overturned. His opinion is that speed was a factor but he doesn't know how fast she had been going other than it was a high rate. He didn't use anything to determine the speed, just measured from where it went off to where it ended up and guessed at the speed. He wouldn't say his estimation is accurate. He doesn't remember anything except that she ran off the road, was thrown out, and her head was cut off. He was told she was following a Nunn boy.

Interview with [REDACTED]

He is a mortician. [REDACTED] had been removed from the scene when he got the call. He picked up the body and brought it to the funeral home. The head was separated from the body but it was all intact; there was nothing wrong with it. It was a clean smooth cut right across the shoulder. There were other things wrong with the body but he concentrated mostly on the head...it was just perfect.

Interview of [REDACTED]

He is a paramedic and responded to the accident. The patient was lying supine behind the wrecked car she had been driving. She was covered with a sheet which they removed and found her to have been decapitated. They then started to look for her head which they found about 50 yards east of the car, up the road.

The car was right side up, on the right side of the road, right in front of her body. He may have looked at the car but doesn't remember anything about it.

They then transported the body to the hospital where the coroner was.

Interview of [REDACTED]

He is the county coroner. When he arrived at the scene, he saw a sheet laying on the bank and was told that that was her head. It was laying, he's guessing, 20-40 ft. from the body, and the body was laying 10-15 ft. from her car. Both the body and the head had been ejected.

At that time, he thought the decapitation had been caused by her having been partially thrown out and the top of the car, the upper part of the door, which had a sharp edge because the molding was gone, very cleanly severing her neck. It very much like a knife-like cut, very very clean with very little bleeding. The amount of bleeding depends on which way the remains are laying. She was laying with her shoulders up as he recalls.

He had her transferred to the hospital where they took blood and urine samples.

This was very unusual in that it was a decapitation. It is very unusual in that it was so clean, right at the shoulder. There was about 2" of her spine protruding out of her shoulder. The other unusual thing was that she had a lot of her personal belongings in the car that were scattered all over. He picked most of these up and presented them to a family member.

He thinks she was ejected when the car turned over; due to both the flipping and the speed of the car. He thinks the curve slipped up on her; that she was driving pretty fast and that's a pretty steep curve. He thinks she got off the pavement on the bank and lost it. She just kept trying to hold it and get it back in the road and in the course, spun around and crossed the road and started to flip.

Pathology of Trauma Attributed to Restraint Systems in Crash Impacts

Although restraint systems have been used in aircraft for years, their use in other forms of transportation has been relatively new. While such systems have conclusively demonstrated their overall protective value, experimental evaluation of the various systems is necessary for designing improved future systems. Very little attention has been given to the type and severity of injuries which may be attributed to generally used restraint systems. The work reported here involves assessing the protection from impact trauma provided by various common restraint systems. The initial project was designed to investigate injury to the pregnant female and/or fetus due to lap belt forces at impact since the question had had some discussion but very little clinical data were available.

Findings:

Lap Belts worn properly, restrains the body by its strongest structural elements, reasonably close to the body CG. These prevent ejection but offer no upper body support in forward or lateral impacts, thus allowing the head and thorax to "jackknife" over the belt. It can, however, be responsible for distinctive injury to the jejunum, spleen, pancreas, duodenum, ileum, and abdominal hernia. Additionally, lumbar compression fractures as well as transverse fractures of the vertebral body have been attributed to high placement of the lap belt which allows the belt to act as a fulcrum, literally splitting apart the vertebral body. In pregnant women, traumatic rupture of the uterus, ventral hernia, and placental separation have been reported.

Diagonal Belts worn without lap belts not only does not provide pelvic restraint, but in side impact produces an extremely lethal whipping action in which the body literally rotates about and out of the belt. There have been reported injuries attributed to this type of belt including chest injuries, ruptured spleen, and sternal fractures. The results of this study show that this system cannot be considered equal in protective capability to the lap belt due to massive destruction of the thoracic cage with extensive avulsion and rupture of the pectoral muscles, numerous rib fractures, and trauma to the kidney, liver, spleen, pericardium, lungs, pancreas, adrenals, rupture of hemorrhage of the sigmoid colon, and dural hemorrhage.

3-Point Systems were fairly new in 1969 when this paper was written with few injuries due to this system having been reported from and Advantages includes the additional protection by preventing flexion of the upper torso. Disadvantages appear to be that it must fit the occupant correctly to be effective and that in side impact, the occupant on the opposite side may slip out of the harness while the near side occupant may receive cervical injury from neck impingement on the belt. Nevertheless, a properly worn 3-point restrain system is clearly an improvement over the lap belt.

Full Torso Restraints have been used in aircraft and have been extensively tested. They have been demonstrated to be extremely effective.

Inverted-Y yoke Double-Shoulder Harness with Inertia Reel system offers the advantages of a full torso support while allowing free and complete movement of the occupant. It is comfortable, easy to slip into without mussing clothes, and fits women comfortably. Test results at 30G showed minor trauma consisting of dural and lung congestion and cardiac micro-hemorrhage. At 45G, trauma was similar except that a scapular fracture occurred as a result of belt impingement over the shoulder. Belt contusions were also observable.

Airbag Restraint Tests consisting of a lap belt and folded airbag were run. One animal was tested twice at 46 Gs with no observable trauma and then run a third time at 50 Gs after which autopsy revealed a ruptured bladder and dural congestion. Another animal, tested at 36 Gs, was allowed to live for 90 and was found to have no trauma.

Conclusions:

While restraint systems may protect the occupant from the very serious trauma that may be caused by ejection or secondary collision, they may, in themselves, act as sources of generally less lethal but yet significant injury. The findings indicate that tertiary collision should be the subject of intensive research. These experiments also provide argument for considering the effects of variation in occupant position in determining the lethality of a given "dose" of deceleration. The tests also demonstrate that abrupt deceleration may have potentially grave effects that may not necessarily be correlated with the degree of tissue disruption or the magnitude of impact forces.

The tests demonstrated the following:

- * The single diagonal chest restraint resulted in immediate fatal injuries at the g-level tested.
- * Simple lap-belt restraints were more effective in preventing injury than the single diagonal belt, but also resulted in serious and fatal injuries at higher g-forces. The available evidence indicates that "loose-high" lap belts contribute to injury severity greater than those snugly fitted and worn low over the abdomen.
- * 3-point belt systems resulted in less injury in this series of tests than did any of the commonly used (ca. 1969) restraint systems.
- * The two experimental devices, Y-yoke with inertia reel and, especially, the airborne restraint system, gave maximum protection to the occupant against tertiary collision injury.

Finally, tests such as these demonstrate need for adequate evaluation of any restraint system on living animals. Tests on anthropomorphic dummies, cadavers, and human volunteers can contribute significantly to restraint development, but the final test of their effectiveness can only be determined in the presence of living animals.

Usage Patterns and Misuse Rates of Automatic Seat Belts by System Type

A study by UNC on seatbelt usage on 4151 late model cars in 1990 indicates the following use percentages for the type belt listed in descending order:

Automatic Belts:	79.6%
Traditional Manual Belts:	76.3%
Air bags	73.9%
Motorized shoulder belts:	94.2%
Accompanying lap belts:	28.6%
Non-Motorized automatic belts	76.9%
Misuse of belt:	6.0%

Use of Automatic Safety Belt Systems in 19 Cities, 1990

Figures are listed for the time period of through of 1989. Overall, usage was down 3% to 85% compared to 1988. Usage in cities with belt use laws was 87% while usage in cities without belt use laws was 78%.

Motorized shoulder belt usage was down 1% to 96% compared to 1988 while those without disconnects remained constant at 98% and those with disconnects dropped 3% to 89%.

Usage of Non-motorized 3-pt systems was down 2% to 75% compared to 1988 and usage of non-motorized shoulder belts dropped 9% to 71%.

There was a 77% usage rate in vehicles with indeterminate automatic belt systems.

Use of Automatic Safety Belt Systems in 19 Cities, 1990

Figures are listed for the time period of through and through of 1990. Overall, usage was down 6% to 79% compared to 1989. Usage in cities with belt use laws was 81% while usage in cities without belt use laws was 73%.

Motorized shoulder belt usage was down 3% to 93% compared to 1989 while usage of those without disconnects dropped 1% to 97% and those with disconnects dropped 3% to 86%.

Usage of Non-motorized 3-pt systems was down 10% to 65% compared to 1989 and usage of non-motorized shoulder belts dropped 6% to 65%.

GM Passive Belts Fail User-Choice Test

A NHTSA sponsored study paid volunteers of varied sizes, both male and female, to rate the shoulder and lap belts and knee bolsters for convenience, fit, comfort, ease of entry and exit, and whether the shoulder retractor worked. It was determined that the GM automatic 3-point shoulder and lap belts are the most uncomfortable and inconvenient passive restraint system.

This may explain why an earlier study showed only 77% usage of GM's passive restraint system while respondents in the same study report 97% usage of the motorized shoulder belt and 80% usage of the non-motorized systems found in other vehicles.

While NHTSA does not mandate the belt type installed in cars, NHTSA spokesman said "maybe the manufacturers will do something with this data."

The biggest complaint was entering and exiting GM cars with the second biggest complaint being seatbelt inconvenience including obscured vision and difficulties buckling and unbuckling the emergency release. Most of the complaints were made by women who were short or overweight or both.

Testimony of Forensic Pathologist in
United States District Court
[Witness for Plaintiff]

Direct Examination
{pages 44 to 55R (*i.e.* 545 to 568)}

Cross-Examination
{pages 55R to 65R (*i.e.*, 568 to 588)}

Redirect-Examination
{pages 65R to 71 (*i.e.*, 588 to 599)}

Recross-Examination
{pages 71 to 72 (*i.e.*, 599 to 601)}

Further Redirect Examination
{pages 72 to 72R (*i.e.*, 601 to 602)}

1 THE COURT: It's admitted.

2 THE CLERK: Step up, if you would, please. Would
3 you raise your right hand, please. Do you solemnly swear
4 that the evidence you shall give in the case now before the
5 Court will be the truth, the whole truth, and nothing but the
6 truth, so help you God?

7 THE WITNESS: I do.

8 THE CLERK: Have a sheet, if you would, please,
9 please state your name for the record?

10 THE WITNESS: My name is [REDACTED].

11 [REDACTED],
12 called as a witness on behalf of the Plaintiffs, being first
13 duly sworn, testified as follows:

14 DIRECT EXAMINATION

15 BY [REDACTED]

16 Q. What's your occupation?

17 A. I'm a licensed physician, my specialty of medicine is
18 forensic pathology in medicine. I serve as the medical
19 examiner in five counties in metropolitan including
20 [REDACTED] [REDACTED] [REDACTED] and [REDACTED]

21 Q. Would you give the jury the benefit of your education,
22 Dr. [REDACTED]

23 A. I received my medical degree from [REDACTED] Medical School.
24 I did an internship and a residency in pathology at [REDACTED]
25 Hospital. I then went to the University of [REDACTED] Medical

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1 School to do a fellowship in forensic pathology in medicine.

2 After completing that I returned to I
3 became the Associate Chief Medical Examiner for [REDACTED]
4 County, where I worked until 1978. I resigned from [REDACTED]
5 County at that time and became the medical examiner for these
6 other counties.

7 During the last ten years I have served as the past
8 director of the [REDACTED] University forensic pathology training
9 program. I am a regional pathologist for the Federal
10 Aviation Administration. I'm a consulting pathologist for
11 the National Transportation Safety Board. I'm a certified
12 instructor in the Police Academy, and an instructor
13 with the National Law Enforcement Training Institute of
14

15 I've been involved in some 20,000 or more death
16 investigations and forensic cases. I've personally done
17 somewhere between eight and 10,000 post-mortems and
18 autopsies. I've been licensed to practice medicine in this
19 state since 1972.

20 Q. Okay. Dr. [REDACTED] where do you originally come from?

21 A. I was born in [REDACTED] General Hospital a long time ago.

22 Q. Okay. And, Dr. [REDACTED] have you had any opportunity as
23 a pathologist to incorporate your pathology skills with
24 investigation of medical -- automobile accidents?

25 A. That's part of what we do in forensic pathology.

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1 Forensic pathology in medicine is actually a specialty that
2 originated and today still is -- primary purpose is to
3 protect the people that we serve. And by doing this we try
4 to uncover things in the community and in the environment
5 that might lead to injury and might lead to death.

6 Very few of the cases we do are murders, and that's
7 what everybody thinks we spend our time doing. About 15
8 percent of them are. The rest of them are different types of
9 cases. One of the most frequent types of cases that we
10 investigate are motor vehicle accidents.

11 We do this for a number of reasons. First of all,
12 a lot of people who die when an accident occurs die because
13 they have had a heart attack or a stroke or something like
14 that, and the accident had nothing to do with it. Unless we
15 do an investigation, which must include an autopsy in most
16 cases, we don't know that.

17 It's because we do examine these people who die in
18 automobile wrecks and because we have gotten information
19 about what happened in the wreck that much of the design of
20 the cars that you drive around in today is as it is.

21 Basic types of injury patterns that we observe,
22 injuries that we don't observe in certain cases help auto
23 manufacturers and engineers to know better how to design some
24 of the aspects of the cars that you drive. I've been doing
25 this for -- since 1974, essentially, when I was doing my

1 training in [REDACTED] The office had a grant where we studied
2 each accident where there was a fatality, with engineers,
3 compared what the injuries were and what happened in the
4 accident so that everyone could better understand what caused
5 the injury.

6 One of the primary roles of the medical examiner is
7 not just to say that you've got a broken arm or that you've
8 got a cut on your head, but to try to help people understand
9 how you got the cut on your head. So that's what we do.

10 Q. Okay. And you've described forensic pathology in terms
11 of what you do. What is the difference between a general
12 ordinary pathologist and a forensic pathologist?

13 A. Well, a hospital pathology -- pathologist who has had no
14 forensic training would have up to the same point the same
15 thing as a forensic pathologist. You have to be a doctor in
16 order to understand what happens to people from disease and
17 injury and trauma.

18 The hospital pathologist reads your breast biopsy
19 if you're a lady and have a lump in your breast and tells the
20 doctor whether it's cancer or not.

21 The hospital pathologist runs the laboratory and
22 interprets the tests that are done in the laboratory. The
23 hospital pathologist usually doesn't need to know much about
24 what kind of a weapon might have caused this particular
25 gunshot injury or what kind of pattern of injuries you would

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1 expect to see in an automobile accident because they don't do
2 that.

3 So we have training in accident reconstruction and
4 bombs, bombings, firearms, ballistics, blood splatter pattern
5 interpretation, public health toxins and hazards so that
6 working in a community as a forensic pathologist we can
7 better serve the people.

8 Q. Okay. And you mentioned training in accident
9 reconstruction as part of your training and even on the job.
10 Do you have a general understanding of occupant kinematics?

11 A. If we don't -- occupant kinematics means what happens to
12 people inside of -- if we're talking about a motor vehicle
13 accident, inside a motor vehicle when it's in an accident,
14 how they move, what happens to them.

15 If we don't have some basic understanding of the
16 physics involved in that, then it doesn't do us any good to
17 do the autopsy because we don't understand what the injuries
18 mean. We just see them and we document them and we wouldn't
19 need to be a pathologist to do that, somebody could take a
20 picture of them and put them in a file somewhere.

21 So we have to have some basic understanding of the
22 physics involved and how bodies and individuals behave in
23 certain types of accidents in order to do the best job that
24 we can do.

25 Q. Okay. And do you have such an understanding of

1 automobile accidents that you are able to relate what's
2 happening to a body in the accident to how the injury is
3 received?

4 A. To a certain extent. Many times I depend on information
5 from engineers and other people that feed data or data into
6 the system so that we can all better understand what's going
7 on.

8 I am not an engineer. I don't do the same things
9 that engineers do, but I do have some basic understanding of
10 some of the principles of physics involved in motor vehicle
11 accidents.

12 Q. Okay. Now, were you asked to take a look at a case
13 involving the death of [REDACTED]?

14 A. Yes, sir.

15 Q. And who asked you to do that?

16 A. You did.

17 Q. Okay. And just tell this jury what you did in your
18 investigation of this case.

19 A. Well, in [REDACTED] of 1990, [REDACTED] contacted my office and
20 advised us that he had a case in which he represented a
21 family who had a young girl who was driving a car involved in
22 an accident, that she had been ejected from the car and had
23 been decapitated. And he wanted me to look at the case to
24 see if I could help him understand the mechanism by which she
25 was decapitated, and I agreed to do that.

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1 Q. Okay. And once you took this case on, would you just
2 tell the jury what steps you took to do your forensic
3 investigation?

4 A. Well, I was first sent the shoulder strap from this
5 accident -- it was some years after it happened. It happened
6 in -- I guess it happened in 1989 or '90. I got the belt in
7 the late summer of 1990, along with about 22 pictures that
8 showed the vehicle, an accident report filed by the
9 law enforcement officials who investigated the case, a copy
10 of the coroner's report, and a copy of some statements taken
11 from various people who saw the body of [REDACTED].

12 One of the first things that I did was to look at
13 this belt, the shoulder belt, and I did this with a surgical
14 microscope that magnifies things anywhere from ten to 40
15 times. And I looked in the webbing of the belt, along the
16 edges of the belt for any stains that looked like blood,
17 anything that looked like tissue, anything that might look
18 like something that came from a body that was stuck on this
19 belt.

20 I saw some mud and dirt and debris on the belt, but
21 I didn't see anything that I could identify as tissue nor
22 stains that I thought suggested that blood was on the belt.

23 I looked at all of the photographs of this vehicle,
24 and I knew that she came out of the car. I don't think
25 anyone disputes that. All of the witnesses found her body

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1 outside of the car, and she's decapitated.

2 So there are very few things that could cause an
3 injury like this. I've investigated approximately 200 or
4 more automobile fatalities every year for the last 15 years
5 and prior to that a lesser number.

6 We seldom see decapitations, except in special
7 circumstances. Certain factors have to be present to cause a
8 decapitation. They're very rare. In fact, up until last
9 year, I personally, even though I've been doing this for
10 nearly 20 years, had never seen a true decapitation in an
11 automobile accident, despite the many that I'd investigated.

12 The only decapitations I had seen were a couple of
13 people run over by trains; in fact, one who committed suicide
14 by placing his neck across the track and letting the train
15 run over him, a case in which -- a couple of cases in which
16 an auto carrier, one of these flatbed trucks that have
17 vehicles on the back, where a car runs up under the back of
18 them and because the height of the flatbed is about level
19 where your head and neck is in the vehicle, if it intrudes
20 inside of the car, it can hit you in the head and neck. And
21 I have seen some partial decapitations from incidents like
22 that.

23 Q. Dr. [REDACTED], while we're on that subject, was there some
24 difference in the appearance of those decapitations from what
25 the reports described to you of the appearance of [REDACTED]

1 [REDACTED]?

2 A. Yes, sir. I was going to go into that.

3 Q. Okay. I'm sorry. You knew what you were doing. I
4 didn't.

5 A. I have a decapitation where a young boy is riding a
6 motorcycle, a dirt bike, and goes under a telephone guy wire
7 at a pretty high rate of speed, and the guy wire decapitates
8 him. Other than those type of cases and murders where people
9 are decapitated by machetes, knives or axes, it's very rare
10 to see a true decapitation in an automobile accident.

11 The literature describes certain types of accidents
12 that we see these in, but in all my years I never saw one
13 until last year. And the one I saw last year had the same --

14 [REDACTED]: Excuse me, Your Honor, I'm sorry.
15 Just, we had filed a motion with regard to the [REDACTED] accident
16 which I assume is what Dr. [REDACTED] is about to start on, you
17 may recall, and we object to that on the similarity of
18 circumstances ground.

19 THE COURT: I overrule the objection.

20 [REDACTED]: All right. Thank you.

21 BY [REDACTED]:

22 Q. Go ahead, Dr. [REDACTED].

23 A. In this particular case, a young woman sitting in the
24 passenger seat was ejected from her vehicle during an
25 accident. She was completely decapitated. I saw that case

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1 after [REDACTED] sent me this case, and because at that point
2 in time I had some serious injury, in a type of case like
3 this.

4 I inspected the car in this particular case myself.
5 I examined the belt myself. I did the autopsy myself on this
6 young girl and I looked as carefully as I could to see how
7 she may have been decapitated. To be quite honest with you,
8 I was not convinced that she was decapitated by a seatbelt,
9 nor was I convinced that [REDACTED] was decapitated by a
10 seatbelt.

11 So I looked for other things that I thought
12 reasonably could decapitate someone. And in my case I found
13 nothing. In fact, I found no blood on the belt in my case,
14 but I did find some little flakes of skin embedded in the
15 webbing of the belt at the level where her neck would have
16 been.

17 The description of the decapitation case that I
18 personally had, the way the body looked, was essentially the
19 way the witnesses described [REDACTED]'s decapitation to
20 occur.

21 So then what I did is think about, well, out of all
22 the types of cases where decapitations have occurred, what do
23 you expect to see? If you lay your head on a railroad
24 track and a train runs over you, you're decapitated by a
25 scissors-like action, something comes down, rolls across your

1 neck and presses the tissues together, and so you get the
2 compression of tissues, and not like it would if I took a
3 machete and just went through your neck cleanly like that.
4 So I didn't see that type of changes in the [REDACTED] case.

5 And there's types of changes that are not described
6 by the lay witnesses who saw [REDACTED]. In the types of
7 cases where a flatbed truck or the edge of a truck like that
8 causes a decapitation or partial decapitation, it's never
9 clean because you've got some thing that's about an inch or
10 two inches wide that comes in and there's a great amount of
11 force, and there's usually a lot of fractures of bones and a
12 lot of trauma to the tissues around it, even though you can
13 get a decapitation or partial decapitation.

14 To decapitate someone, the neck, which is,
15 depending on the person, anywhere from four inches to six
16 inches in diameter, has to be able to go all the way from one
17 side of it to the other. Or the body has to slide across
18 that object from one side to the other. So there can't be an
19 object that would stop whatever is cutting through the neck
20 from going all the way through it.

21 So going back and thinking about all the cases I
22 see and all the people that are ejected from cars, I had
23 never seen a case exactly like this. So I had evidence in my
24 case that led me to believe that there was no other
25 reasonable conclusion except that this belt had decapitated

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1 her.

2 Well, everybody said, well, how can a nylon belt
3 that's soft cut through somebody's neck and cut through bone?
4 Well, nylon is as strong as steel if you -- if you anchor it
5 at two points, you virtually can't break it. I have some
6 horses, that if you put a nylon halter on them and tie them
7 up and they get excited they can break their neck, the halter
8 won't break, even though 1,000-pound animal is straining
9 against it to get out of the halter. So they're strong.
10 They're strong enough to do it.

11 All it requires is the proper circumstances where
12 the body gets against it in a certain way that it can get
13 through the skin, which is the greatest barrier to it
14 initially, and then pass through the tissues.

15 You might compare it to say, well, how can a piece
16 of paper cut you? And you've all probably had paper cuts
17 from the edge of a piece of paper. Circumstances have to be
18 right to cut your finger with that edge of the paper. Or
19 when you're a kid and you're trying to make a whistle with a
20 blade of grass, and you've got a blade of grass and you can
21 cut your finger with a blade of grass. So it's common
22 circumstances in ordinary life tell us that things that
23 ordinarily can't cut in certain cases can cut and do that.

24 Well, then I got concerned, well, there's not any
25 blood on my case, and no blood did I see on this belt. And I

1 got to thinking about all the cases that we see where people
2 are cut, decapitated, et cetera, where there's no blood on
3 the object.

4 In fact, in people who are stabbed, there's only --
5 50 percent of the time there's blood on the knife. Why is
6 that? Because when a knife or something goes through tissue
7 and passes on through many times, it's wiped off. So I
8 wasn't concerned that I didn't have blood on my belt. In
9 fact, the literature in some of the cases that's described
10 doesn't describe blood on other cases where other people have
11 concluded that decapitation occurred from things such as
12 seatbelts.

13 This lady, [REDACTED], had a fractured leg,
14 everyone thinks it's her left leg. Her face was described as
15 free of any injuries, even abrasions that it almost looked
16 like you could put make up on her and she would be all right.
17 The lady in my case had nothing, no other injuries on her
18 face except where her face had laid in some gasoline and had
19 gasoline burns on her. She had no fractured nose, no
20 fractured face, no fractured jaw. Neither is any reported in
21 [REDACTED].

22 Granted, no one medically examined [REDACTED], so
23 there's a lot we don't know about her, really. But the
24 people that observed her didn't observe any disfigurement of
25 her face, any asymmetry of her chest, and this tells us

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1 something, too, because it tells us she didn't hit anything
2 inside the vehicle or outside the vehicle hard enough to at
3 least disfigure her face and disfigure her body.

4 So it's just like the case that I -- that I
5 personally had. I looked at the sun roof because I at one
6 time thought possibly she was somehow decapitated by going
7 through the sun roof, not by the glass, but by the edges of
8 it. I have some pictures of the sun roof that show that it's
9 a -- has a rolled lip around the edge.

10 Q. Do you want to go ahead -- do you want these now?

11 A. Yeah, I could, I guess.

12 [REDACTED]: Judge, I've got Plaintiffs' Exhibit [REDACTED]
13 [REDACTED] and [REDACTED] that I believe are photographs.

14 BY [REDACTED]:

15 Q. You can look at those that you took, Dr. [REDACTED].

16 A. Yes, sir. I took these photographs in [REDACTED] of the
17 Nissan that [REDACTED] was riding in. Could I come down to
18 show the jury these?

19 [REDACTED]: Yeah. Your Honor, I tender those at
20 this point.

21 [REDACTED] No objection.

22 THE COURT: They are admitted.

23 [REDACTED] May he come down and show the jury?

24 THE WITNESS: This is a photograph looking down
25 through the top of the sun roof, and you can see the sun roof

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1 obviously has a lip where the glass sets in it that's
2 recessed so that it's smooth across the top. It's not just
3 an edge like the edge of this pen sticking out, it's an edge
4 that sits down lower than the portion above it.

5 If you look at Plaintiffs' Exhibit ■■■, taken from
6 inside the vehicle, you see that the roof liner and padding
7 is right here. You can see this lower edge, and then you see
8 sticking up about an inch or more the frame that this glass
9 fits down into.

10 If you take an ax and you made an ax that had a
11 blade that stuck out like this, and then you welded a piece
12 of metal onto that ax that stuck out like this and tried to
13 chop a tree down, the blade would go into the tree, but when
14 it hit that piece of metal, the piece of metal would stop the
15 ax so you could only chop so far through the tree.

16 If it was possible that she somehow hit against
17 this, and accident people say loading, it means you hit up
18 against something, it is possible for it to cut into her
19 neck, but probably, because it is so wide, I mean, it's that
20 depth about from the bottom of it to the top, we probably
21 would get some significant bruising and some significant
22 injury around the skin, even though it might be capable of
23 cutting through the skin.

24 The circumstances would also have to be that she
25 would slide across this thing far enough for it to go through

1 her neck. So if she did, if this is the outer edge of that,
2 and let's say it's the driver's side, if it's going to
3 decapitate me, it means my head's got to be up above it and
4 my body's got to be below it. If it's going to cut my head
5 off, it's got to pass through it like this, which means my
6 body is now going to be inside the vehicle and not coming out
7 the side over here.

8 If I say I decapitate myself with the passenger
9 side of it, that somehow I'm thrown up through it like this,
10 then my body is going to continue to go through this side of
11 it and my head is going to go out that side of it. So there
12 are a lot of things to consider, not just what the object
13 looks like. Could it decapitate someone? But could it
14 create the same type of injuries you see? And would the rest
15 of what happened be consistent with that decapitating
16 someone?

17 If the belt decapitates someone, as she's thrown
18 out the driver's window or out the sun roof, the shoulder
19 strap comes across her neck like this, as she's going out the
20 window, her head can -- this belt can go right through her
21 neck, her head can go out, as the car continues to roll on
22 over, her body has already started out the window, and it can
23 go over in this direction over here.

24 If she's coming out the sun roof the belt still can
25 decapitate her because many of the studies that show people

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1 with belts -- only these belts on in simple front-end
2 collisions show that sometimes the feet of the person they
3 were testing, and these were babboons and cadavers, were
4 actually up in the air, horizontal, and the belt is around
5 their neck like this, in simple front-end accidents, not just
6 in rollover accidents.

7 So no matter where she comes out, the belt is
8 capable of doing it. And the type of injury she has, is like
9 has been described in cases like this ever since the 1960's.
10 And, granted, I have personally never seen one until last
11 year, but I believe that I personally had a case, and as far
12 as I can tell, it's exactly like this case here. And it
13 still may seem incredible, it sometimes seems incredible to
14 me, to think a belt which you can bend can do something like
15 this.

16 But I know that my own case that -- where I even
17 have a marking on the neck consistent with a pattern in the
18 belt is what did the case that I examined. So I personally
19 believe that my own experience shows that the literature is
20 right, that you can be decapitated by these things.

21 And in every case there are two factors that are
22 always constant. One, the person must be ejected. The
23 reason you have to be ejected is because you have to somehow
24 load on the belt. The second factor in almost every case was
25 that there was only a shoulder strap, no lap belt and no

1 other restraint system involved. And that is -- that is also
2 consistent with my own experience.

3 In America, the first belts we used in cars were
4 lap belts. In fact, doctors used the first ones, they tied
5 ropes around them because they saw people getting thrown out
6 of cars and injured, so they would tie ropes around
7 themselves and the American Medical Association finally
8 convinced some people to try to pass laws to require lap
9 belts in cars.

10 The literature doesn't talk about decapitations
11 when we were using lap belts. I didn't see any back in the
12 '70's when lap belts were used. In America we didn't go to
13 just shoulder sashes, we went to lap belt first and we added
14 the shoulder sash to it. When we added shoulder sashes to it
15 in those years we had those I never saw a case like that.

16 But now we have vehicles where it is possible for
17 for vehicles only in America to have only a shoulder sash.
18 And when you put this belt on, then you're restrained only by
19 a diagonal belt. And since those things have been possible,
20 it has nothing to do with the particular type car, whether
21 it's a Nissan or a Ford or anybody else, it's the mechanics
22 involved, not whether it's a Nissan or a Ford car.

23 But when you have those occur, you can have
24 injuries that you don't get in any other type of
25 circumstances where you have these other parts of the

1 restraint systems present.

2 Q. Dr. [REDACTED], let me show you Plaintiffs' Exhibit No. [REDACTED]
3 which has been admitted into evidence. Are you familiar with
4 that article?

5 A. Yes, sir, I have read it a number of times and had it in
6 my file for a couple of years.

7 Q. And where is that article from?

8 A. It's from the [REDACTED] and it was printed in
9 1967.

10 Q. Okay. And who's the author of that article?

11 A. A doctor named [REDACTED] who was with the Department
12 of Forensic Medicine in the University of [REDACTED]

13 Q. Okay. And would he have done a comparable job to what
14 you do in [REDACTED]

15 A. I'm not sure. He did forensic medicine, but I'm not
16 sure whether he did exactly what I did. I would suspect that
17 much of what he did was like some of the things that I do.

18 Q. Okay. Is that article helpful to you as a forensic
19 pathologist in helping you reach conclusions you came to in
20 [REDACTED]'s case?

21 A. I believe it is. It describes three very similar cases,
22 two with complete decapitations and one with partial
23 decapitation.

24 Q. And do you know what kind of belt was being used in that
25 particular case?

1 A. In all three cases, a simple diagonal shoulder strap was
2 being used.

3 Q. And was there anything about the nature of the injuries
4 that is consistent with [REDACTED]'s case?

5 A. Well, they are all described as being clean, even the
6 one that's a partial decapitation, and the edges are clean.
7 They are all described as -- at least in one case they found
8 no blood on the belt. In one case they found some tissue on
9 the belt and a few drops of blood, and in another case they
10 found some tissue on the belt.

11 And that would go along with the fact that in many
12 cases you probably don't find any significant amount of blood
13 or tissue on the belt. The [REDACTED] case, we don't even
14 really know whether there ever was any blood or tissue on the
15 belt because no one got the belt and examined it right away.

16 On the belt that I had, I had it within 24 hours of
17 when the accident happened. It had been protected by the
18 police at my direction. It had been covered. The car had
19 been completely covered. And on an area about three inches
20 long under the microscope, I found not a piece of tissue you
21 could see with the naked eye, but one that you could see
22 where the magnifying glass and under the microscope the cells
23 off the surface layer of your skin, so it depends on when you
24 get the piece of evidence, how it's been cared for before you
25 get it, and a lot of factors whether you're going to find

1 anything or not.

2 Q. Okay. Would it be possible even for a larger quantity
3 of tissue in the elements to have dissipated?

4 A. Sure. If rain or weathering or animals had gotten to
5 the belt and it had tissue on it, even insects would feed off
6 the protein part of the blood or tissue that might be on the
7 belt. If it wasn't true that water would get rid of these
8 things I'd be in a lot of trouble, because I do autopsies
9 almost every day, and I only put on an apron. So I sometimes
10 get blood on my sleeves or on my collar.

11 If I run into the restroom and put water on it I
12 can get it out. And if I send it to the laundry it comes
13 back without any blood on it. So a lot of things can get rid
14 of blood. Simple water can get rid of it most of the time,
15 depending on how soon it has access to getting to it. Blood
16 also breaks down. The tests that we use for blood depend on
17 the proteins in the blood being intact. Weather breaks these
18 proteins down.

19 So there are some times that we have cases where we
20 can see a drop of blood and know it's blood but the tests
21 that would tell us it's blood don't tell us it's blood and
22 the reason is -- is that because they are depending on the
23 protein structure in the blood to react with chemicals to
24 prove that it's blood. And when it's so old, sometimes the
25 chemicals can't react with it.

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1 So it seems kind of funny because we say we see
2 this drop of blood and all the laboratory tests say, well, it -
3 we can't prove that it's blood.

4 Q. Would you expect to find a significant amount of fraying
5 or deformation of a belt in a situation like this?

6 A. No, sir. In fact, the cases described in the literature
7 don't describe such. I didn't have any -- I could find some
8 stretched fibers in the belt that I examined myself
9 personally in the case that I looked at myself, not the
10 [REDACTED] case, but I don't even know when they occurred.
11 They might not have had anything to do exactly with the
12 accident.

13 Q. Okay. Now, do you have an opinion, Dr. [REDACTED], as to
14 what was the mechanism of decapitation of [REDACTED] based
15 on all of the factors that you have given us here today?

16 A. Well, we talk about probabilities and certainties, and
17 in the courts of law, probability is 50 plus one percent,
18 which is flipping a coin. I don't ever testify if all I can
19 do is 50 plus one percent because I don't think that's really
20 fair, personally. I think that approaching 90 percent in my
21 own mind, based on the literature, my own experience and what
22 I saw in this case and subsequently in another case, that
23 [REDACTED] was decapitated by her body striking the
24 seatbelt, sliding partially down it as she was being ejected,
25 allowing the seatbelt to break into the skin, pass through

1 her neck, and decapitate her. I feel as certain of that as I
2 could feel.

3 Q. Okay. And as a medical doctor having investigated
4 deaths in literally thousands of accidents, do you have any
5 medical opinion as to whether or not had [REDACTED] been
6 properly restrained with a lap belt, whether she would have
7 had any life-threatening injuries from this rollover?

8 A. Well, she could have, but there is no other trauma to
9 her that anyone describes except her broken leg. She didn't
10 have a squished nose or a caved in face or a caved in jaw or
11 a caved in chest. She may have had some injuries we don't
12 know about.

13 Even though the car has a good bit of damage, when
14 you look at the occupant space inside the car, it's really
15 not decreased too much, so there is a great likelihood if she
16 had on a lap belt, too, that kept her from being thrown all
17 the way to one side of the car or somewhat kept her from
18 being bombed out against the roof when it was upside down,
19 that she would have not had any injuries that would have been
20 fatal or even significant.

21 There is the possibility, of course, that she could
22 have been killed, even belted.

23 Q. But medical probabilities, would they be in her favor or
24 against her?

25 A. Her own body would tell us that if we can believe that

1 people that looked at it about what was seen on the outside
2 suggests she would -- it would have been in her favor.

3 [REDACTED] He's your witness.

4 CROSS-EXAMINATION

5 BY [REDACTED]:

6 Q. Dr. [REDACTED], let me start off, if I could, because I
7 think in your testimony that you talked about the two
8 accidents. Let's, if I can, separate the two initially in
9 the jury's mind --

10 A. Okay.

11 Q. -- so that we won't be confusing the two. [REDACTED]
12 had her accident in [REDACTED] of 1990 --

13 A. Yes, sir.

14 Q. -- is that your understanding? And in [REDACTED] of that
15 year, you were sent some material and retained to assist
16 [REDACTED]?

17 A. Yes, sir, I was, yes.

18 Q. All right. And you used the term, "my case," and you
19 and I know what that means, but I want to make sure the jury
20 understands.

21 A. Okay.

22 Q. You are the medical examiner by contract with a number
23 of counties in the metropolitan [REDACTED] area?

24 A. Five, yes, sir.

25 Q. All right. And so -- and [REDACTED] County is one of

1 those?

2 A. It is, yes, sir.

3 Q. And so when you say my case, that means that the [REDACTED]
4 case, which is this other case that you've been talking about
5 took place in [REDACTED] County, and you investigated that as
6 part of your responsibilities as a medical examiner?

7 A. Yes, sir. The law required me because of my position to
8 investigate that death.

9 Q. And the [REDACTED] case took place -- I don't have the date, it
10 was in 1991, was it not?

11 A. First of 1991.

12 Q. of 1991. And the [REDACTED] case, your case, involved a
13 Ford Escort?

14 A. It did, yes, sir.

15 Q. All right. And we're talking -- we'll talk in a little
16 bit about the differences in the accident, but it did not
17 involve a rollover?

18 A. No rollover, no, sir.

19 Q. And it involved two occupants, a driver and the
20 passenger, who in this case was the lady who was killed?

21 A. That's correct.

22 Q. Okay. And they were struck in the side, as I recall, on
23 the passenger side by a vehicle, they had hydroplaned and
24 gone off on the other side of the road?

25 A. That's correct, yes, sir.

1 Q. And neither -- neither the driver nor [REDACTED] was
2 wearing the lap belt?

3 A. That's correct.

4 Q. The [REDACTED] case -- the Ford Escort does have a motorized
5 two-point system?

6 A. It does, yes.

7 Q. And the -- it has a manual lap belt?

8 A. Yes, sir.

9 Q. And that -- as I said, neither lap belt was attached,
10 correct?

11 A. That's correct, yes, sir.

12 Q. Now, that occurred in [REDACTED] At that time you had not
13 seen the -- [REDACTED] Sentra, had you?

14 A. Had not seen the car?

15 Q. You had not been to the car?

16 A. No, sir, I did not see the car until [REDACTED] of this
17 year.

18 Q. Just a month or so ago?

19 A. Yes, sir.

20 Q. So everything up until that point in the [REDACTED] case had
21 just been material that had been sent to you and so forth?

22 A. The belt and photographs, yes, sir.

23 Q. Okay. And so distinguishing the [REDACTED] case, which is "my
24 case," meaning that you investigated it as the medical
25 examiner, from this case, you are not acting in your capacity

1 or were not, at the time that you were retained by [REDACTED]
2 as the medical examiner?

3 A. It was on a private basis, and I was paid to review the
4 case, and I'm being paid to be here to testify today.

5 Q. All right. So -- in addition to your duties as medical
6 examiner, you also consult privately with persons who have no
7 involvement in -- with your cases?

8 A. Almost all of us do in my specialty, and I do, yes, sir.

9 Q. All right. And it was in that capacity that [REDACTED]
10 sent you the materials on this case?

11 A. It was, yes.

12 Q. Now, as I understand, that was in [REDACTED] of 1990.

13 A. It was, yes.

14 Q. And that would have been -- excuse me. I misled you.

15 Do you have the letter there in your file that --
16 where [REDACTED] sent you the materials?

17 A. He first called me in [REDACTED] of '90. He didn't send me
18 the materials until [REDACTED] of '90. That first letter that I
19 had was in [REDACTED] you're correct about that. The first call
20 was in [REDACTED]

21 Q. But you're right about [REDACTED] Okay. So he hired you in
22 [REDACTED] is that right?

23 A. I don't know if he hired me at that time, but he called
24 our office at that time.

25 Q. Did you get any materials at that time?

1 A. No, sir.

2 Q. So it would have been when you first got some
3 materials --

4 A. Yes, sir.

5 Q. -- regarding the matter. And do you have a letter in
6 your file there that -- where he sent you those materials?

7 A. I probably do.

8 Q. It's Exhibit A to your deposition, if you'd prefer to
9 use that, whichever is easiest.

10 A. The first call was on the of 1990?

11 A. Yes, sir, I have the letter.

12 Q. All right. And you were sent some materials that you've
13 already talked about, but specifically I want to refer you to
14 paragraph No. there on the first page.

15 A. Yes, sir.

16 Q. Where it says that you were sent two baggies; is that
17 right? One of which had -- have you got the belt?

18 No, has got it.

19 BY

20 Q. One of which had the seatbelt. is gone. I'll get
21 it later. One of which had the seatbelt in it and the other
22 of which had some scrapings, which it was represented to you
23 had been scraped off the belt by ^{attorney} in the presence of
_{wrecker operator}

24 And, in fact, it says, that which is believed
25 to be human flesh which was scraped off of the belt and put

1 in the baggy in the presence of [REDACTED]

2 A. Yes, sir.

3 Q. And so at least it was your understanding of what you
4 had been provided that that was the material that [REDACTED]
5 [REDACTED] thought was flesh?

6 A. Well, it was my understanding they thought it was, but I
7 don't ever assume that what a lay person sends me and tells
8 me it is, is necessarily that, but that's what the letter
9 said it was.

10 Q. I'm not really arguing with you about what he thought or
11 not, but it was certainly, at least from this letter, conveys
12 to you the idea that an effort was made to preserve and send
13 send to you whatever it was that [REDACTED] saw?

14 A. Yes, sir.

15 Q. Okay. And you took one quick look at that and realized
16 it wasn't tissue; correct?

17 A. I didn't take a quick look.

18 Q. No, I didn't mean to --

19 A. Because someone thought it was, and I never take a quick
20 look at something else. When I think that I have a different
21 opinion I say, well, maybe I'm wrong, I better take another
22 look. In fact, I had other people take looks also and I did
23 it on more than one occasion so it wasn't a quick look, but
24 my final decision was that there was nothing I saw that was
25 consistent with flesh or human tissue.

1 Q. No, that's what I was trying to get, I didn't mean to
2 suggest that you did it quickly, but you took a look under a
3 microscope at the material he sent you, both the scrapings
4 and the belt. And you concluded from just looking at it with
5 the microscope that it was not blood or tissue?

6 A. Not tissue and nothing consistent with blood.

7 Q. All right. And, in fact, you were so certain of that by -
8 based solely on your microscopic examination that you didn't --
9 decided not to even bother to do a chemical test because you
10 knew what the result would be?

11 A. I had a feeling, plus I was also under the understanding
12 that someone else may have already done some chemical tests,
13 and that's why they were seeking another opinion about the
14 belt.

15 Q. All right. All right, sir. So in -- and you, again,
16 going back to [REDACTED] for a minute, you've, in your
17 investigations, I think you feel generally that eyewitnesses,
18 I think you use the word are notoriously unreliable?

19 A. Many times, yes, sir.

20 Q. And so you always prefer, during your investigation, to
21 use the physical evidence and the scientific evidence rather
22 than any recollection of an eyewitness such as [REDACTED]?

23 A. We try to use scientific evidence either to tell us that
24 the eyewitness was correct or maybe the eyewitness was wrong
25 in their interpretation.

1 Q. But in -- and insofar as the physical evidence is
2 concerned, and it would appear at least from this letter that
3 an effort was made to give it to you, your scientific
4 investigation revealed that the material that [REDACTED]
5 thought was flesh was not?

6 A. That's correct.

7 Q. Okay. Now, it's not clear to me what else you did at
8 that point with regard to the [REDACTED] case. You had -- you
9 said you had some articles which we'll talk about in a
10 minute, and you had some photographs.

11 A. I had 222 photographs, I believe. Some of those showed
12 the car. Some with the belt still in the car that you could
13 see certain aspects of the belt in the car. I had those. I
14 had the belt, and that's all that I had from this specific
15 case.

16 Q. And, in fact, that's all --

17 A. Well, no, that's not. I had the accident report and
18 these other things that I have mentioned.

19 Q. The coroners report, you mean?

20 A. Yes.

21 Q. And, in fact, I take it that you really did nothing on
22 the case up until the time that you had the occasion to
23 investigate the [REDACTED] case?

24 A. I didn't do what now?

25 Q. You didn't do anything further with this case until

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1 after the [REDACTED] accident occurred?

2 A. Well, I didn't do anything with this case even after the
3 [REDACTED] accident occurred until I went and looked at the car in
4 of this year.

5 Q. All right. So you got the material. You looked at it.
6 You determined it was not tissue and blood and you did
7 nothing until after the [REDACTED] case?

8 A. That's right.

9 Q. All right.

10 A. I mean I didn't have anything else to do anything with.

11 Q. Let me -- you told the jury some things about seatbelts,
12 and you gave sort of a quick history of seatbelts in this
13 country. Did you -- I mean, you believe in seatbelts?

14 A. Definitely, yes, sir.

15 Q. And you believe that people ought to wear seatbelts?

16 A. I do it religiously, believe everyone should.

17 Q. And yet you know as the medical examiner and having
18 investigated -- how many did you say, 20,000 fatalities?

19 A. Well, I've -- probably more than that, just in general
20 consults and everything else, but I've personally done about
21 10,000 autopsies.

22 Q. But in terms of automobile accident fatalities, how many
23 would you say?

24 A. 200 a year times 15 and add a few to that, so however
25 many that comes to, several thousand.

1 Q. Several thousand. And I take it that during the course
2 of those investigations, that you have seen a lot of people
3 who were killed because they weren't wearing their seatbelts?

4 A. I have, yes.

5 Q. Similarly, you've seen a lot of people whose lives were
6 saved because they were wearing their seatbelts?

7 A. A lot. I have, yes.

8 Q. And you do understand, I think, from some conversations
9 that we've had previously, that the reason to have any sort
10 of passive restraint system like this is because people were
11 not wearing their seatbelts?

12 A. That's right.

13 Q. Now, you've talked about this article that -- this
14 Swedish article. Do you still have that up there? I think
15 it's --

16 A. I do, yes, sir.

17 Q. Is it two or three or [REDACTED]?

18 A. I said London, but it is Sweden, yes, sir.

19 Q. Yeah. Okay. Oh, I'm sorry, yeah, Sweden. All right.
20 And it's two --

21 A. It's [REDACTED].

22 Q. And it describes, as you have said, three accidents?

23 A. It does, yes.

24 Q. All of which involved doors coming open and ejection?

25 A. Yes, sir.

1 Q. And, of course, the door did not come open here, did it?

2 A. It did not, no.

3 Q. All right. And the door did come open in the [REDACTED] case?

4 A. It did, yes.

5 Q. And [REDACTED] was, in fact, ejected through an open door?

6 A. That's -- there's some dispute about where her body
7 actually came out, but I believe that her head and body
8 probably came out the door now.

9 Q. Referring you, if I could, to the -- the article which
10 describes these accidents with the diagonal safety belts?

11 A. Yes, sir.

12 Q. And more specifically on page [REDACTED], the discussion.

13 A. Okay.

14 Q. What does that first sentence say?

15 A. "The instances where the belt has caused trauma are very
16 few compared with frequency with which it has saved car
17 occupants from injury in collisions."

18 Q. And the next sentence?

19 A. Mine is not printed, but some man's name and [REDACTED]
20 for example, found no fatal injuries caused by the use of a
21 belt in 944 car occupants who had been wearing a belt at the
22 time of collision.

23 Q. So that whoever did this study found that out of some
24 almost 1,000 accidents that there were -- injuries were
25 caused by the belt itself on three occasions?

1 A. Well, no, they found other injuries, which it goes on to
2 talk about, but it also says that the injuries of these were --
3 decapitations were few, fatal injuries.

4 Q. And the suggestion, was it not, in the other 944 that
5 the belt in effect saved the lives, is that not correct?

6 A. Yes, sir.

7 Q. And you know that to be true yourself, do you not?

8 A. I do, yes.

9 Q. And although you've had this experience with the [REDACTED]
10 case and with what you believe happened with -- in the [REDACTED]
11 [REDACTED] case, do you have any information as to how effective
12 the two-point motorized belt system is even for those people
13 who choose not to -- or don't use their lap belt?

14 A. It's effective in some cases, but there's a growing body
15 of literature to suggest that there are a lot of injuries,
16 not just decapitations.

17 I'm investigating nine other cases that have to do
18 with two-point restraints that were fatal injuries caused by
19 the fact that only a two-point restraint was used. Back in
20 the late 1960's, all of the tests that were done comparing
21 these different systems placed it as the most dangerous of
22 the three, i.e., the lap belt, the single diagonal or the
23 three-point restraint.

24 I would not dispute there are many cases where just
25 the diagonal belt may save someone's life and prevent injury.

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1 At the same time, if it is used in conjunction with a lap
2 belt, it is a much more effective protector.

3 Q. You have a pretty extensive library of seatbelt
4 material, I've seen it, do you not?

5 A. I guess about eight inches or ten inches thick of
6 articles, yes, sir.

7 Q. These are materials that you've collected because of
8 your interest in seatbelts?

9 A. Yes, sir.

10 Q. Let me show you what's been identified as Defendants'
11 Exhibit [REDACTED] and ask you if you have seen that previously?

12 A. I can't say that I have read it. I may have it, but
13 being honest to the Court, I'd have to say I don't recall
14 this article specifically.

15 Q. Do you have any reason to dispute the conclusion in the
16 article that the motorized two-point system is the most
17 effective -- I think if you would read the language in that
18 last paragraph.

19 [REDACTED]: Your Honor, if he hasn't reviewed the
20 article, I don't see how he could dispute or not dispute the
21 article.

22 THE COURT: I don't think there's any doubt that he
23 could do one or the other. I overrule the objection.

24 THE WITNESS: Do you want me to read the last
25 paragraph?

1 BY [REDACTED]

2 Q. No, sir, just -- really the question is, and you -- if
3 you would just tell the jury what the language is, the
4 conclusion that's drawn in the last paragraph.

5 A. Okay. The high use rates for the Toyota non-detachable
6 motorized belts plus their good effectiveness means that they
7 are likely to save at least as many lives in any restraint
8 manual or automatic at actual use rates. They are also
9 likely to be more cost effective.

10 The paragraph above that which you didn't ask me to
11 read says, though, that they show that the Toyota belts
12 reduced ejections but probably not to the same extent as a
13 three-point manual belt, so I think even this article says
14 that the three-point system is more effective than just a
15 two-point system.

16 Q. If you wear it?

17 A. Yes, sir, if you wear it.

18 Q. What that says is that taking into account use rates,
19 taking into account sometime people don't put on their
20 three-point system or in this case a manual lap --

21 A. Yes, sir.

22 Q. -- taking all those things into account, that this
23 system is the most effective seatbelt system available.
24 Isn't that what it says?

25 A. It's certainly better than nothing at all, yes, sir.

1 Q. All right, sir. And that's why it's there, it's not
2 there, is it, Dr. [REDACTED] to hurt somebody?

3 A. Oh, definitely.

4 Q. Or to trap somebody?

5 A. Well, it's not there for -- it's there for the purpose
6 of protecting lives.

7 Q. It was put there for that very purpose, was it not?

8 A. It was put there for that purpose, yes.

9 Q. And that article would suggest at least it's been very
10 effective in that regard?

11 A. Well, the article proves, like we all know, that they do
12 reduce injuries and fatalities.

13 Q. Now, let me, if I could, direct your attention back to
14 our case and to [REDACTED]'s accident. I touched just
15 briefly on some differences between that accident and this
16 accident. There's no question, is there, that that accident
17 colors your thinking about what caused her injury here?

18 A. I had the same opinion before the accident. That
19 accident, I think, convinced me, to use those words.

20 Q. I've touched -- I said a little bit on the -- some of
21 the differences, and let me do that again just to bring the
22 jury back. That was a Ford Escort driving down the road,
23 U.S. [REDACTED] out in [REDACTED], went across the road and got struck
24 by an oncoming vehicle?

25 A. And began to spin.

1 Q. And began to spin. And [REDACTED] was sitting on the
2 passenger side?

3 A. Yes, sir.

4 Q. And was ejected out through a door which opened?

5 A. Yes, sir.

6 Q. And, in fact, the impact was on her side, and she moved,
7 she moved toward the door?

8 A. She would have loaded on the door, yes, sir, struck the
9 door.

10 Q. All right. Whereas here, of course, you understand this
11 involves, I think it's fair to say, a relatively high speed
12 rollover, where multiple forces would have been acting on
13 [REDACTED]?

14 A. A completely different type of force, yes, sir.

15 Q. You said you had done some kinematics. I didn't hear
16 any. Did you see how [REDACTED] loaded this door, for
17 example? Did you look -- when you looked at the car, did you
18 see how she had loaded the door here?

19 A. I took a picture of it, which I think I didn't show the
20 jury. When I stood up on top of the car and looked down, you
21 can see that the door panel on the driver's side is bowed out
22 probably about four to six inches.

23 Q. And did you see where she made contact with it
24 vertically?

25 A. I don't know what you mean by vertically.

1 Q. Up and down?

2 A. Well, when she made contact with it laterally. She also
3 made vertical contact with it also.

4 Q. And did you get any feeling as to where it was in terms
5 of height from the seat and so forth?

6 A. Well, most of the deformation is, I would say, from the
7 door window ledge to the seat, about halfway up.

8 Q. Now, I think I said this. The door here, though,
9 although it was substantially deformed, did not open?

10 A. Did not open. At least there's no evidence that it
11 opened.

12 Q. All right. And another difference here, at least in
13 terms of forensic evidence, is that you found actual skin on
14 the belt in the [REDACTED] case.

15 A. I did.

16 Q. And you were not able, although you have lay testimony,
17 you were not able to make that determination here.

18 A. I didn't find any, no.

19 Q. In the [REDACTED] case, you were -- you also actually detected
20 a pattern that matched the seatbelt --

21 A. Yes, sir.

22 Q. -- on the injury site?

23 A. I did.

24 Q. And you have no evidence of that here?

25 A. No, sir. I don't know that anyone examined it with that

1 in mind -- this lady with that in mind, but there is no
2 evidence of it.

3 Q. All right. In the [REDACTED] case, there were also other
4 abrasions indicating to you at the injury site that it had
5 been caused possibly by something like a seatbelt rather than
6 a metal object?

7 A. Yes, sir.

8 Q. And, again, you understand, at least from your
9 information, that this injury here has been described as
10 very, very clean?

11 A. Yes, sir. The injury I saw was very clean. I think
12 clean is a generic word. In fact, I have photographs of that
13 case which, if you personally would like to see them, I
14 believe you would say that it looks like someone cut
15 head off with a knife.

16 If you look very closely, you will see that various
17 aspects of the wound actually are ragged somewhat, but if you
18 just stand back and look at it, it looks like somebody took a
19 knife and cut head off.

20 Q. But again you -- upon examination, you saw all these
21 things which caused you to conclude that the seatbelt did it?

22 A. Not just what I saw, but understanding what the
23 engineers and everyone tell us what happened in the accident,
24 but, yes, what I saw was a great determinant of my opinion in
25 that case.

1 Q. Well, let me ask you about that. How important was it
2 to you and to them that the door came open?

3 A. It wasn't to me, only that she got ejected. I think
4 ejection is the necessary factor in a decapitation case.

5 Q. You've read the report about how important -- I mean, in
6 a report to you, you've seen the report?

7 A. Yes, sir.

8 Q. It was certainly described as significant that the door
9 in fact came open?

10 A. Well, I think it was significant because if the door
11 hadn't come open and if she hadn't been ejected she would not
12 probably have been decapitated.

13 Q. Now, let me go up to this other thing. You just
14 recently went back to see the vehicle.

15 A. the -- I'll give you the exact date --
16 last day of

17 Q. And you will agree with me, sir, that there has been
18 contact in the area of the sun roof?

19 A. No, sir. I'll agree there's -- yes, there's been
20 contact with that part of the vehicle with something, yes,
21 sir. There's deformation at the lips and at the edges of the
22 sun roof. In fact, one of the photos I showed the jury shows
23 some of that bending at the lip of the sun roof.

24 Q. Let me, lastly, then, address the question that you --
25 and you gave some testimony on this in your direct, and that

1 is your opinion -- opinions with regard to the injuries that
2 would be likely to be received in this accident. Did you --
3 did you rely on anybody in particular's reconstruction of
4 this accident in formulating any opinions about likelihood of
5 injury?

6 A. Well, I've read a lot of literature, but for 18 years
7 I've been seeing people in cars that rollover and I see what
8 kind of injuries they have and what the survivors have
9 sometimes also, so a lot of it is common medical forensic
10 sense.

11 Q. I'm not sure, maybe I didn't say -- ask you very well.
12 What I'm asking you is, in making your -- the judgment you
13 you gave [REDACTED] about whether or not she might have been
14 hurt in this accident in any event, did you rely on anybody's
15 reconstruction or anybody's -- or the speeds or the forces or
16 anything of that sort? That's what I meant to ask you.

17 A. Well, I assume the vehicle had a speed of 50 plus miles
18 an hour probably when it tripped and started to roll,
19 somewhere in that area, since I think having read some of
20 your experts' depositions as well as some of those of the
21 plaintiffs, that it's somewhere in that ballpark which I
22 would agree.

23 You used the word a high speed type rollover, that
24 certainly is consistent with something like that. I used the
25 damage that I see to the car as well as some of the

1 descriptions of [REDACTED] to arrive at those opinions. So,
2 yes, I did use some of the opinions of other people.

3 Q. All right. And making that assumption, I believe you
4 believe that even if [REDACTED] had been wearing her lap belt,
5 although the passenger compartment was reasonably intact, you
6 may -- you believe that she would have had life-threatening
7 injuries and possibly even a fatal injury; isn't that
8 correct?

9 A. She could have, certainly, without any doubt, could have
10 had something like that.

11 [REDACTED] All right. Thank you, Dr. [REDACTED]

12 THE COURT: Anything further, [REDACTED]?

13 REDIRECT EXAMINATION

14 BY [REDACTED]:

15 Q. Yes. Dr. [REDACTED], while she could have had life-
16 threatening injuries, what's the medical probability?

17 A. Based on what she looked like, how she's described, the
18 probability is that she wouldn't have had such.

19 Q. Would not have had such?

20 A. Would not have had such. [REDACTED] other than having her
21 head cut off, had no other injuries whatsoever except a few
22 bruises. So had her head not been cut off, she would have
23 been alive, yet she was thrown out of a car also. So I see
24 nothing in the [REDACTED] case, at least from what is described
25 that I have to go on, which obviously is limited to suggest

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1 that she would have received a fatal or serious life-
2 threatening injury.

3 Q. Okay. And are you assuming that she was or would she --
4 was -- or was -- would not have been ejected -- would there
5 be a difference in your opinion had she been properly lap
6 restrained as opposed to only had the two-point belt and not
7 had her head cut off?

8 A. If she had had the lap belt on and hadn't been ejected,
9 the probability of her being alive without serious injury is
10 great.

11 Q. Okay. Now, you were asked about your opinions as they
12 related to the [REDACTED] case. Did you reach an opinion before the
13 [REDACTED] case ever happened and share it with me as to what cut
14 her head off?

15 A. Months and months before the [REDACTED] case.

16 Q. And what was your opinion at that time?

17 A. That she was decapitated by the shoulder sash or the
18 strap across her shoulder.

19 Q. And did the [REDACTED] case do anything to change your opinion
20 one way or the other?

21 A. No, sir. A lot of people give you opinions based on
22 what they have read or are studying anthropomorphic dummies
23 and things like that and they have never even seen a real
24 injury before in someone.

25 I had seen a lot of injuries, but I was still

1 skeptical. There was a part in my brain that said, well, am
2 I really believing this? And I think that when I saw the [REDACTED]
3 case, even though I'd read all the literature and believed it
4 could happen, the [REDACTED] case told me, yes, in my own
5 experience, now I believe that it can happen.

6 Q. Have you seen the statement of [REDACTED], the man
7 who actually conducted the funeral for [REDACTED], as to the
8 nature of the injury in this case?

9 A. Yes, sir.

10 Q. Okay. And is that consistent with what you found the
11 injuries in the [REDACTED] case?

12 A. Everyone's statement about where the injury is, what it
13 looks like, is totally consistent with it, short of the fact
14 that no one really describes an abrasion on the skin.

15 And in every case, in this Swedish literature and
16 in my own case, we're dealing with a -- cases where medical
17 personnel have done the examinations and with light skinned
18 people, people that may even have looked anemic, like me, in

19 case she is black. And from my own business, we
20 know it's easier to see a bruise or an abrasion on someone
21 that looks like me than on someone with very dark skin.

22 Q. So does the absence of a description of abrasion affect
23 your opinion one way or the other?

24 A. It makes it more likely it's the belt, because if she
25 somehow cut her head off going through the sun roof on the

1 lip of that sun roof, you're dealing with something that
2 can't bend, other than the fact that the lip bent up. You're
3 dealing with an object that's an inch and a half or an inch
4 thick that's got to pass through her neck, and the
5 probability of getting a bruise or an abrasion from that is a
6 hundred times greater than from the belt.

7 So if we assume that she didn't have such, then the
8 belt becomes still the most probable mechanism.

9 Q. Okay. Had you been given a description with a lot of
10 abrasion around the base of the neck, would that tend to make
11 you lean to something away from the -- rather than the
12 seatbelt?

13 A. No, sir. I don't think mechanically she could have been
14 decapitated. The mechanics aren't right for that sun roof to
15 have done it. Her body has to move in a certain way and her
16 head has to move in a certain way, and if her head gets cut
17 off and goes through the sun roof, her body has to still be
18 in that vehicle longer than it would be if she goes through
19 the window.

20 If she's still in that vehicle while it's beginning
21 to roll, you've got a body in there that has a heart that
22 could still pump a couple times and you've got all these open
23 vessels, and no one describes any blood inside the vehicle
24 which tells you probably that at the time of decapitation
25 from that point on that the rest of her body is on its way

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1 out, and I think all the evidence points to the belt.

2 Q. Okay. Now, you've got -- as a forensic pathologist and
3 as a medical examiner, you don't have time to go out and look
4 at every crime scene, do you?

5 A. No, sir. I've got ten investigators with video cameras
6 and .35 millimeter cameras and polaroids. I go out and look
7 at some of them myself, but in most cases, even the
8 complicated cases, somebody from my office goes out.

9 Q. If -- well, do you rely on your investigators and your
10 police officers to make visual observations that you rely on?

11 A. I have to, yes, sir.

12 Q. If you knew that the original investigating trooper in
13 this case also said, hypothetically, because you maybe don't
14 know this, but if hypothetically he had also testified here
15 in court that he saw flesh on that belt, does that change
16 your opinion one way or the other, taking into account that
17 you didn't find any flesh on the belt?

18 A. Well, what I didn't find doesn't mean anything, because
19 I saw the belt after somebody else had done tests on it,
20 somebody else had looked at it, after it had been in the
21 wrecker yard, in the car for weeks or months.

22 I would be surprised if I still found something on
23 it. I don't know whether these other people saw flesh on it.
24 If there was flesh on it, it would certainly -- if we can
25 approach 100 percent certainty that the belt did it, then we

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1 would approach that.

2 █████ Okay. Judge, could he step down and
3 just draw something █████ talked about, the
4 deformation on the door, just on this pad so I think the jury
5 can understand it?

6 BY █████:

7 Q. Dr. █████, you had described some deformation on the
8 door, and I'd like for you to place the seat as it relates to
9 the door and give the jury some indication of where this body
10 likely would have been when it struck the door?

11 A. You will quickly see that I'm not an artist. This is,
12 actually, the photograph of the door that's already been
13 admitted. I didn't show you awhile ago, it's █████,
14 Plaintiffs' Exhibit.

15 I'm standing up on top of the car looking down at
16 that door, and you can see how it warped out to the side
17 right up here at the top. This is the top of the car. I'm
18 standing looking down at it. Instead of being flat across
19 here, you can see it's pushed out there. So where she would
20 load on this car, the maximum loading, based on what I saw,
21 is from -- this is the window ledge here, would be from about
22 the mid -- they are all photographs of the side of the car,
23 at some point midway between the seating height and the
24 window ledge itself.

25 Q. And do you have an understanding as to her having a

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1 broken left femur; is that correct?

2 A. Yes, sir.

3 Q. Do you --

4 A. The greatest bending is right here at the very top, and
5 you can see from this photograph --

6 Q. Do you have any opinion what caused this deformation
7 right here?

8 A. I think it's consistent with her loading and possibly
9 going through the window. Her broken leg could have occurred
10 anywhere, even hitting the ground outside. I think it would
11 be ridiculous for me to try to tell you where she got a
12 broken leg. It could be a lot of places she got it.

13 Q. Without going into that, did you see evidence of where
14 her body was striking the door as it relates to the seat?

15 A. Striking the door about where -- from her hips up, would
16 be on that side of the door.

17 Q. Okay. If she had struck that door with the force on the
18 upper part of her body, would you have expected to find
19 evidence of -- with that much force, would you have expected
20 to find evidence of some other injuries other than just a
21 broken femur, maybe in her rib cage?

22 A. We might, but we don't know what it looked like inside.

23 Q. Okay. Is there any idea where her buttocks might have
24 been when she struck that door, assuming she was striking
25 that -- that was her body striking that door?

1 A. Well, I showed you a car right side up and when the door
2 impact occurred, it's probable that it was upside down -- or
3 likely that it was upside down, so it could have been her
4 buttocks that hit that. There's no way to really know.

5 Q. Had her buttocks been properly restrained into the seat,
6 is there any way any of these injuries, including the
7 ejection, could have happened? Well, probabilities that it
8 would have happened?

9 A. If she had on the lap belt and the shoulder belt and it
10 all stayed intact, there's a 98 percent probability,
11 probably, that she wouldn't be ejected.

12 Q. And, finally, Dr. [REDACTED], you were asked to comment on
13 this Defendants' Exhibit No. [REDACTED] and you had indicated
14 there were some portions that weren't read to the jury. Can
15 you make a fair comparison of manual systems including use
16 and non-use rates with a two-point passive belt that's
17 assuming close to 85 to 100 percent use, is that a fair
18 comparison to compare all use of manual belts to passive
19 belts, as far as the effectiveness of the belt itself?

20 A. No, sir. If you're looking at whether someone is trying
21 to justify something or not, I think that you have to read
22 between the lines sometimes. If there is anyone in the
23 country who would dispute the fact that the three-point
24 restraint is not better than the two-point restraint, then
25 that person knows nothing about accidents, injuries, and

1 restraint systems.

2 There is also the fact that the two-point restraint
3 is better than no restraint at all, and some of those are
4 better than others. So I think that's what the facts are.
5 And the facts are also true that if you only have a car with
6 a manual lap belt and an active restraint where it moves up
7 by itself that all of the studies done to date show that a
8 significant number of people don't use a manual lap belt
9 either because they don't realize the importance of using it
10 or because they are lulled into thinking that when this
11 automatic device comes up that everything is all right.

12 I get into cars sometimes where those belts are,
13 and I have to go maybe a mile sometimes before I remember to
14 put that manual lap belt on. Some studies have shown as many
15 as 60 plus percent of the people with cars that have the
16 motorized belt system forget to use that lap belt.

17 And I'm not saying that that single lap belt
18 doesn't help those people when that's all they've got on, it
19 does. I'm just saying that unless you use a three-point
20 restraint, you're creating a situation where the belt itself
21 can be more dangerous, sometimes, than the accident could be.

22 Q. Have you seen a -- as a pathologist investigating
23 accidents, a difference in the last few years in a -- in the
24 pattern of injuries attributable to the belt?

25 A. Certainly.

1 Q. And what has that pattern been?

2 A. We're seeing more and more cases where, if the person is
3 not using a three-point restraint, that we're seeing a
4 particular type of injury pattern. We're seeing it now, but
5 it's been described in the European literature forever, since
6 the late 1960's.

7 Q. And what is that injury pattern?

8 A. A significant number of chest injuries attributable to
9 the fact that if you're only wearing this belt across your
10 shoulder, you're in a head-on collision, your body can scoot
11 down, up underneath that belt, it can snag on your neck, it
12 can break your neck, whether it decapitates you or not.

13 And if you're not wearing this lap belt, if you're
14 in a head-on collision, nothing stops the bottom part of your
15 body from going forward. The purpose of this belt is three,
16 the three-part of the belt; one, it slows your deceleration
17 down. If you've got a battering ram against a door, and you
18 want to break the door down, the further back you get from
19 the door and slam it in, the more force you generate.

20 And so what a seatbelt system does is it slows down
21 your moving towards something in the car and it also takes
22 the forces that are being generated and spreads them out all
23 over your body. If you take away the lap belt, spreading
24 them out doesn't exist as much because they are concentrated
25 over this one area. So the studies that go back nearly 20

1 years and what we're seeing now are injuries to the heart,
2 injuries to the liver, injuries to the spleen, and injuries
3 to the lungs that, percentage wise, you don't see if they are
4 using a three-point system.

5 Q. When the three-point system was almost exclusively in
6 use, did you see a lot of that in the United States?

7 A. You still saw injuries from belts, but you did not see
8 the frequency of these injuries that we're beginning to see.
9 And we're just beginning to see them because this system
10 where the circumstances are such for there to be just the use
11 of the two-point restraint are basically new, within the last
12 two years, three years.

13 Q. Now, is that the same in Europe where the diagonal belt
14 was in use in the '60's?

15 A. No, sir. The European literature is full of reports
16 that show that this system is an unsafe system compared to
17 others.

18 Q. And when would those reports have come out, what years,
19 approximately?

20 A. The late '60's, early '70's.

21 Q. Okay. Just one second. Dr. [REDACTED], does your
22 investigation of auto accidents also include some rollover
23 cases?

24 A. Most cases of wrecks are either run off the road, hit an
25 object, or spinning. About ten percent I guess are

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1 rollovers, so a significant percent, but they are not the
2 majority.

3 Q. Okay. And in rollover cases, is there a different type
4 of injury pattern and a different type of risk that would
5 exist in a -- say a frontal collision or an angular
6 collision?

7 A. Yes, sir. The risk of ejection is much greater in a
8 rollover, if you are not restrained properly. The injury
9 patterns are also different.

10 Q. Okay. And what type of restraint is most effective in a
11 rollover in preventing injury and ejection?

12 A. If we're only given a choice of between a lap belt and a
13 shoulder belt, the one you would choose would be the lap belt
14 only to prevent you from having ejected.

15 [REDACTED] That's all.

16 RECROSS-EXAMINATION

17 BY [REDACTED]:

18 Q. Dr. [REDACTED], I just want to address one thing you said
19 about your explanation about the absence of blood in the
20 vehicle. That was your understanding?

21 A. Well, I don't -- I again caution the Court and myself
22 not to believe that there wasn't any blood in the vehicle,
23 just that no one documented any blood in the vehicle.

24 Q. But you seemed to suggest that that supported your
25 notion that the sun roof could not have caused the

1 decapitation?

2 A. It is a piece of evidence that does support that notion.
3 If we assume that there wasn't any blood in the vehicle.

4 Q. You do understand, of course, that in terms of the facts
5 of this accident and where the people investigated it, that
6 head was ejected from the vehicle some
7 substantial distance from where her body was subsequently
8 ejected?

9 A. As was the case, yes, sir.

10 Q. All right. And so even if your theory is correct, her
11 body would have been in the car for some substantial period
12 of time --

13 A. No, sir.

14 Q. -- after the -- after the decapitation?

15 A. No, sir, not in my theory. In my theory, her head comes
16 off possibly as the car -- if this is the car rolling like
17 this, passenger's side down, at some point in time she loads
18 and her head is decapitated as she's probably coming out the
19 driver's side window, leaving her head here. At the same
20 time her body, if this is like a window, my head is out, now
21 my upper torso is coming out.

22 And as this car flips on over, it's going to cast
23 my body ahead of where the car is going, so I expect her head
24 possibly to be in the opposite direction of where the car is
25 or her body is.

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1 If I keep her in the car to go through the sun
2 roof, I've got to move her to one side of this roof line or
3 the other, which is going to put her body in the car longer,
4 and I've got her body starting out at the same time her
5 decapitation is occurring.

6 Q. Let me ask you this about the studies -- studies you
7 have talked about. Have you seen any recent studies in
8 connection with these motorized restraint systems?

9 A. I have talked with the people at the National
10 Transportation Safety Board who have been doing a study for
11 about six months now collecting cases with diagonal belt
12 cases but it has not been a printed study.

13 Q. You have not seen any recent studies regarding the
14 usage?

15 A. No, sir. No.

16 ██████████: Thank you.

17 FURTHER REDIRECT EXAMINATION

18 BY ██████████:

19 Q. Just one brief line here. Dr. ██████████ if you assumed
20 that there was blood in the car, would that change your
21 opinion in any way?

22 A. No, sir, no, sir. There was blood in the car in my
23 particular case. I don't know where it came from but there
24 was blood there.

25 Q. Okay. And if you assumed that there was blood toward

1 the top of the door, would that change your opinion?

2 A. Well, there could be blood at the top of the door if she
3 came through the door window on the driver's side, so, no,
4 sir, it would not.

5 [REDACTED]: Thank you.

6 THE COURT: Anything further? You may step down.
7 Let's take about a ten-minute break, ladies and gentlemen.

8 (Whereupon, a brief recess was had.)

9 (Jury not present.)

10 THE COURT: All right. [REDACTED], do you rest?

11 [REDACTED]: Judge, I have got to make a couple of
12 tenders to the Court outside the presence of the jury which I
13 can do now or I can do later on, as long as realizing -- it's
14 the offer of proof. I make a request on the punitive damages
15 issue, I have taken those exhibits and reduced them to
16 writing and attached the exhibits we would have tried to
17 introduce.

18 THE COURT: Just give them to [REDACTED] we're not
19 going to take the time.

20 [REDACTED]: Also I had tried to do a blowup, Judge,
21 introduce a blowup which you denied I'd like to at least for
22 the record --

23 THE COURT: Do what?

24 [REDACTED]: -- let [REDACTED] --

25 [REDACTED]: He can't hear you.

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1 ██████: I'm sorry. I tried to let ██████████
2 talk about a blowup of a letter we talked about that had the
3 word "airbag" in it that came from part of the Federal
4 Register comments on rule-making procedure, and if I could
5 just tender as an offer of proof also Exhibit ████████ which
6 incorporates the letter and the Federal Register comments.

7 THE COURT: Accept it as a tender, ██████████
8 Don't send it out.

9 THE CLERK: Yes, sir.

10 ██████: And with that, plaintiff rests, Judge.

11 - - -

TRANSPORTATION RESEARCH CENTER

Indiana

ON-SITE AUTOMATIC SHOULDER BELT INVESTIGATION

Testimony in U.S. District Court

of Defendant's Expert Witnesses

CASE NO. - 94-04

FLEET - PRIVATE VEHICLE

LOCATION -

ACCIDENT DATE - 1990

Submitted By:

1994

Contract Number: DTNH22-94-A-07048

Prepared for:

**U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590**

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Testimony of Accident Reconstructionist in
United States District Court
[Witness for Defendant]

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Recross-Examination
{pages 77R to 82 (*i.e.*, 809 to 819)}

1 you will state your name for me, please.

2 THE WITNESS: My name is [REDACTED] it's

3 [REDACTED].

4 [REDACTED],

5 called as a witness on behalf of the Defendants, being first
6 duly sworn, testified as follows:

7 DIRECT EXAMINATION

8 BY [REDACTED]

9 Q. Where do you live, [REDACTED]?

10 A. I'm from [REDACTED],

11 Q. And is that in the [REDACTED] area?

12 A. Yes, just [REDACTED] of the city.

13 Q. And where do you work?

14 A. I work for [REDACTED] Research Corporation in [REDACTED]

15

16 Q. Okay. And will you explain to the jury, please, what
17 [REDACTED] Research does?

18 A. Well, [REDACTED] Research is a company based in
19 that provides consultation in the overall area of injury
20 causation analysis and biomechanics and now in accident
21 reconstruction. When I joined the company in [REDACTED] we
22 expanded that.

23 Q. You said you went to work for that company in [REDACTED]

24 A. Yes, sir.

25 Q. And before that, what did you do?

1 A. Before that I was with General Motors Corporation.

2 Q. And how long were you with General Motors?

3 A. That was 31 years. I had 31 years of service with GM
4 before that.

5 Q. And what were the circumstances of your leaving General
6 Motors?

7 A. A retirement was available and I took it.

8 Q. Let me take you back a little bit, if I could,
9 [REDACTED], and ask you to tell the jury, if you would, about
10 your educational background?

11 A. Well, the educational background is I have a Bachelors
12 Degree in Mechanical Engineering in [REDACTED] from General Motors
13 Institute. That's a engineering college in [REDACTED],

14 Q. And would you describe for the jury just briefly what
15 General Motors Institute is?

16 A. Well, it's an engineering college, but it's run on the
17 co-op plan, so that students mix almost on a one-to-one basis
18 work experience with their sponsoring plant and class time at
19 school. So that over a year of attending class, in the
20 beginning I would spend six months in class and then six
21 months at my work assignment. That altered, that changed
22 over time, because I began to get longer single intervals
23 than a month at a time.

24 But by the time I left it was still alternating
25 that period. That goes for four years where the basic

1 academic work in mechanical engineering was covered.

2 Q. And your degree from there is in mechanical engineering?

3 A. Yes, it's a Bachelor of Mechanical Engineering.

4 Q. And the work, you say sponsoring division, did you --
5 you had a division of General Motors that you were working
6 with, as well?

7 A. Yes, sir. I was sponsored by the [REDACTED] Engineering
8 Center. [REDACTED] is one of the divisions of General Motors,
9 and their engineering center sponsored me through work
10 experience in all of the engineering that [REDACTED] was doing at
11 the time. That included the proving ground, the design labs,
12 the test labs, and manufacturing facilities.

13 Q. Are you a registered professional engineer in any state,
14 sir?

15 A. In [REDACTED] yes, since [REDACTED].

16 Q. And what does that mean?

17 A. That basically means that I've been tested for
18 competency in engineering and have demonstrated, I've
19 forgotten how many years of experience before that was
20 granted. It's a combination of a test of engineering
21 principles and proof of experience in the field.

22 Q. When did you actually go to work for General Motors?

23 A. I began in [REDACTED] of [REDACTED] as a student.

24 Q. And then how long did that period of time where you were
25 in this cooperative program last?

1 A. That -- it lasts -- as the co-op plan for four years and
2 then the fifth year is the time during which a thesis is
3 written, and then at the end of that fifth year, the degree
4 can be granted, and that's when it was.

5 Q. Now, after you graduated from General Motors Institute,
6 would you tell the jury what you did next?

7 A. Well, in the fifth year, my work -- my work experience
8 was basically engine design. I was at an engine design -- in
9 an engine design lab, room, and worked in that group as a
10 designer and a layout man for four years, until 1968.

11 Q. And following that, you obviously remained with General
12 Motors.

13 A. Yes.

14 Q. And what did you do next?

15 A. In [REDACTED] I got a chance to interview and interviewed for
16 and got the assignment of a senior research engineer with a
17 group that worked on -- a group called Product Analysis
18 within [REDACTED]. And their job was to review performance of
19 the [REDACTED] products on the field -- in the field and on the
20 road at that time.

21 Now, it largely involved litigation-oriented
22 situations, and I was working mostly in vehicle dynamics and
23 eventually in crush mechanics.

24 Q. And how long did you work in that position with

25 [REDACTED]?

1 A. Well, for [REDACTED], it was from [REDACTED] until [REDACTED] and it
2 was during that time that I began to do some reconstruction
3 work. But in [REDACTED] a corporate decision was made to gather
4 together the groups that had been doing that kind of work in
5 the various divisions, like [REDACTED] and [REDACTED] and [REDACTED]
6 into a single corporate staff and in [REDACTED], that's where I
7 went.

8 Q. And what was the name of that group, sir?

9 A. Engineering Analysis was the name of the group, and it
10 was part of the engineering staff or the corporate staff that
11 basically handled corporate projects and corporate interests.

12 Q. And what was your position and title with that
13 organization?

14 A. Well, initially, it was senior analysis engineer. It
15 just changed from research to analysis, and that was the
16 initial position.

17 Q. And did that position change over time?

18 A. Yeah. Well, if you start from [REDACTED] and you go through
19 the time frame, there was a change in [REDACTED] to a staff analysis
20 engineer. In [REDACTED] or [REDACTED] to a senior staff analysis engineer.
21 And there was another step in there that I can't recall. And
22 then in [REDACTED] I became a principal staff engineer and then in
23 [REDACTED] I retired.

24 Q. All right. [REDACTED] would you describe generally
25 for the jury your duties and responsibilities in those

1 various positions with Engineering Analysis at General
2 Motors?

3 A. By the time I got to Engineering Analysis I had pretty
4 much zeroed in on accident reconstruction as the principal
5 activity that I was going to be doing and doing, and it
6 expanded over time through the vehicle dynamics elements,
7 through the crash mechanics and occupant kinematics, things
8 like that. And that just became an increasing responsibility
9 and an increasing part of my assignment until about [REDACTED] I
10 began to supervise other engineers doing that work and that's
11 where I was when I retired.

12 Q. Before we get to your work in this case, let me ask you
13 this: Are you a member of any professional organizations?

14 A. Two.

15 Q. Would you tell the jury what they are, please?

16 A. The first one would be the Society of Automotive
17 Engineers. That's a -- it's actually an international group
18 of engineers in the automotive field or mobility related is
19 the way to identify it. It isn't just automobiles, it's all
20 kinds of mobility, and that's -- I'm not sure how long that's
21 been. Early [REDACTED] is when I became a member. It's an
22 organization of automotive engineers who regularly exchange
23 papers and prepare standards and publish bulletins of that
24 nature.

25 Q. Are you active in that organization? By that I mean do

1 you hold any --

2 A. Yes, I have two roles within the organization that I
3 have. One of them is the -- as a member of the accident
4 investigation practices committee, serving on some forum
5 groups and some standards groups.

6 Q. Just to make it clear, this group is not limited to just
7 General Motors engineers?

8 A. No. No, as a matter of fact, it's a -- that one is
9 particularly widely -- widely based. It's engineers -- a few
10 engineers from the manufacturers, but it's largely consulting
11 engineers from around the country and from around the world.
12 There are plenty that are from too.

13 Q. And does that group have regular meetings where
14 presentations are made on engineering and technical kind of
15 topics?

16 A. Yes. The group actually sponsors three levels of
17 activities. One of them is the standards level I mentioned.
18 The other is a forum group which organizes smaller groups of
19 engineers to discuss and plan certain subjects. And the
20 other, the third, would be a presentation level of situation
21 where, as in, for instance, the annual congress, a paper
22 session, a day full or two days full of papers would be
23 presented by the group.

24 Q. All right. And have you presented any papers to that
25 organization?

1 A. Yes, two.

2 Q. And would you tell the jury what, just generally, the
3 nature of those papers, their titles and what they were
4 about, just quickly?

5 A. The first one was in [REDACTED] and it was a paper on
6 photogrammetry. It's really a simple process of using the
7 facts shown in a photograph to gain metric or measurements
8 from that. It's a technique of -- method -- of analysis of
9 photographs.

10 Our particular program is just one that converted a
11 main frame or a big complex program into one that would run
12 on a personal computer.

13 Q. Just give an example of how photogrammetry can be used?

14 A. Well, let's say after an accident is over for five years
15 or three years or something, there are photographs of skid
16 marks but you go to the scene and of course they are all
17 gone. If I am able to define the roadway and measure
18 something that didn't go away like cracks or manhole covers
19 or something like that, I can determine the relationship
20 between the photograph and the roadway. And then I can, once
21 I establish that mathematically, then you can go back and
22 forth and, in effect, replot the skid marks.

23 It's a simple technique there for two dimensional --
24 a two-dimensional surface. There are other ways that you can
25 do now with 3-D also.

1 Q. And when did you present the other paper and what was
2 its topic?

3 A. In the congress in [REDACTED] I presented a paper on the
4 reconstruction of rollover collisions. That was -- it was
5 just -- that covered the subject of the reconstruction issues
6 involved and the rollover collision situation.

7 Q. And let me go on for a minute and we'll come back to
8 that. Tell me, you mentioned earlier that you belonged to
9 two organizations. Tell me what else, what other
10 organization do you belong to?

11 A. Oh, the other one is AAAM. It's the Association for the
12 Advancement of Automotive Medicine. It's basically an
13 organization that addresses and deals with the issues of
14 automotive accident trauma.

15 I wouldn't -- when I began interest in that group,
16 I didn't think that they would really be interested in having
17 an accident reconstruction person as a member, but it does
18 prove to be, and they have asked me to do some things there
19 that have proved to be helpful to everyone about things that
20 happened.

21 Q. About the -- have you participated in any panels or
22 groups for that organization?

23 A. Yeah. One of the things, sort of a fun project that I
24 got involved with was I asked to be a member of a panel that
25 was given the task of reviewing all of the SAE papers and a

1 number of other technical papers to pull together a
2 compendium of the state of the art on accident
3 reconstruction.

4 And we did that in -- I'm trying to remember, was
5 that [REDACTED] or [REDACTED] And that book was published. That turned
6 out to be a nice thick book, but that was an interesting
7 project.

8 Q. And in AAAM, have you been involved in any presentations
9 there?

10 A. Presentations. I haven't done any papers, but I've been
11 asked to speak to the seminars and the groups on the subject
12 of accident reconstruction a couple of times.

13 Q. We've -- that term has been used in this courtroom
14 several times this week. Tell -- explain to the jury what
15 accident reconstruction is, please, sir?

16 A. Well, it's -- one of the ways I like to look at it is to
17 just sort of look at the terms, accident, is the crash or
18 collision of an automobile or truck. We all think -- pretty
19 much understand that part.

20 Reconstruction basically is trying to take all the
21 facts that you can find and bringing them back together to
22 try to understand the whole. As an engineer, mechanical
23 engineer, I have some training and experience that will help
24 me bring some of those pieces back together a little better
25 than before I had that training, so I can understand how to

1 relate some of the pieces of the puzzle, so to speak.

2 As a mechanical engineer then I try to do that. I
3 try to gather the factual information and bring it back
4 together so that I can understand the answer to one question,
5 what happened?

6 Q. And how is it used? How do you use, when you bring
7 those pieces back together, how is this accident
8 reconstruction used?

9 A. Well, it can be used to just -- to try to answer those
10 questions, specifically what happened and then maybe there
11 are some more important issues in a particular case like how
12 fast, what lane, what direction did the person turn or not,
13 when did the brakes come on? A number of issues might be
14 able to be addressed by the reconstruction work, but it
15 depends then on the specific needs of that particular case,
16 what's of controversy.

17 Q. How do you go about doing this? How do you go about
18 doing that job?

19 A. Frankly, the toughest part is gathering the facts, pull
20 as much of the facts as you can together so that you can
21 carefully review what there is, what the facts are.

22 And then it's usually a matter of just
23 understanding how to understand the facts and how to use them
24 to come to some of the conclusions about speeds and
25 directions and other issues like that.

1 For an engineer, we try to do that in terms of a
2 geometric layout, like a map. We try to do it in terms of
3 conservation of energy or conservation of momentum, and we
4 try to understand the forces and accelerations. To the
5 extent the facts will allow that, that's as far as we go.

6 Q. How long have you been doing that sort of thing and
7 involved in that sort of work?

8 A. That began in [REDACTED], so that's almost 24 years.

9 Q. And do you have a rough estimate of how many accidents
10 you might have reconstructed during that time period?

11 A. Well, it's -- yes. It's hard to do exactly but I've
12 estimated somewhere over 2,000. It may be pushing 2500 by
13 now.

14 Q. You mentioned that you had written a -- an article or a
15 paper, excuse me, on rollover accidents. Would you explain
16 to the jury how rollover accidents may differ or whether or
17 not there's something special about reconstructing a rollover
18 accident versus some other kind?

19 A. Well, actually, the rollover accident that -- one of the
20 main differences is time. If we just run into a tree or
21 crash into another car, usually it's over, a tenth of a
22 second, the crash is over and everything is done. The energy
23 has been managed and handled.

24 But a rollover seems to take a long time, several
25 seconds, and it involves more than just one crash, it

1 involves a number of impacts. Each time the vehicle strikes
2 the ground or some object there will be another crash and
3 another impact that will have to be resolved in terms of what
4 happened to the vehicle and what happened to the people
5 inside.

6 So the rollover poses quite a different issue to
7 deal with in terms of reconstruction. The other thing that
8 happens in a rollover is that most of the crashes you look at,
9 you might not think too much about it, but they are
10 two-dimensional. They are going this way and that way, and
11 you don't leave the ground by very much, and about the only
12 rotation you really worry about is what we'll call a yaw,
13 where the vehicle turns its direction and stays on the
14 pavement.

15 When you go into rollover, all of a sudden you've
16 got three dimensions, X, Y, and Z, you've got up and down,
17 too, and now in addition to roll, to the yaw motion I
18 mentioned on the pavement, we've got roll motion and pitch,
19 end over end. So things become about six times more
20 complicated in terms of the motion.

21 Q. Now, [REDACTED] your company obviously -- you're in
22 the consulting business now?

23 A. Yes, sir.

24 Q. You're not employed by an automobile company?

25 A. That's correct.

1 Q. And as such do you -- are you available to be retained
2 to assist in reconstructing accidents?

3 A. Yes.

4 Q. And were you asked to do that in this case by me?

5 A. Yes, sir.

6 Q. And would you tell to the jury, please, what you did in
7 that regard; that is, what you did in order to reconstruct
8 this accident?

9 A. Okay. The first thing was to work with your office in
10 gathering the factual information, getting the police report,
11 any of the photographs made of the scene, any statements or
12 depositions or information from the witnesses at the time,
13 try to gather that data, pull together vehicle
14 specifications.

15 I know what kind of a vehicle it is, I need to know
16 how long it is and how much it weighs, things like that. And
17 work together whatever facts we can gather. And that was
18 done initially. And then the facts continued to roll in as
19 the progress of the investigation went on.

20 The next step was to come to actually
21 and to and to examine the vehicle and to
22 examine the accident site. That was in of this
23 last year.

24 Q. Starting first with the vehicle, describe for the jury
25 the sort of things that you were looking for and how you go

1 about that inspection in order to recreate the accident or
2 reconstruct the accident.

3 A. Well, I had a fair idea of generally what we were going
4 to be seeing because I had some -- at least some laser copies
5 of vehicle photographs. I knew that it was a Nissan Sentra
6 hatchback and I knew that it was damaged in a rollover, and I
7 could see some of the general damage.

8 But the photographs I had didn't help me very much
9 in understanding the directions of motion or all of the
10 damage and there's very -- there was fairly little on the
11 interior that I could tell by, so that was my objective.

12 I started going over the exterior from the point of
13 view of what it all looked like and then details of the
14 contact marks and scrapes and scratches and then some of the
15 interior contacts also.

16 But the objective is to try to get a record of what
17 happened to this vehicle in that rollover.

18 Q. All right. Did -- you said you also went to the scene
19 of this accident over in County?

20 A. Yes. In I made a stop at the scene, actually
21 before I went to the vehicle for a short time, about an hour
22 or so and determined, frankly, that I was going to need more
23 time than I had that day to do a full analysis.

24 I found some of the debris from the vehicle and
25 some of the artifacts, but it was, frankly, the ditch was so

1 overgrown with grass and weeds that I felt like it was going
2 to be helpful to come back and trim that and take a real
3 close look.

4 Q. All right. And did you do that? In other words, have
5 you been back to the scene of this accident?

6 A. Yes, I got back there in of this year, right
7 after the the first -- I think it was the of and
8 we spent the whole day there trimming out the higher grass.
9 There had already been some cutting by the county or the
10 state, but we trimmed it out a little further and then made a
11 hands and knees examination of the area to find the tire
12 paths, to find the glass debris, to find the vehicle parts
13 and components and any of the ground damage that helped us --
14 helped me to identify all the things that I could about what
15 happened.

16 Q. And during this second inspection, did you do anything
17 else other than what you have described?

18 A. Well, at each -- each place that I found some artifact
19 of the accident, I left a survey flag, just a little metal
20 wire with a flag on it noting a number. And a surveyor was
21 there and he observed what I was doing, and he came with his
22 crew and measured the location of each of those flags so that
23 they could be put on a map.

24 And he had already prepared a map after my first
25 trip of the area of the accident, but now that I had

1 artifacts from the accident, it was time to put them on a
2 map, too.

3 Q. And was that done at your direction?

4 A. Yes.

5 Q. All right. And did you do anything else with regard to
6 the scene, in terms of the vehicles or what you saw or
7 whatever?

8 A. Well, at that time that was -- that was pretty much the
9 objective. I wanted to also get a little better prints of a
10 couple of photographs that had been made by some prior
11 investigators, and I took some photographs myself of the --
12 of the area, and I drove through the accident scene a couple
13 of times to just get a feel for what we were looking at and
14 what that was.

15 Q. Let me take you back, if I could, to your vehicle
16 inspection. You have said that you took photographs there.

17 A. Yes.

18 Q. And have you had those photographs -- we've made some --
19 had some transparencies made of those photographs?

20 A. Yes.

21 [REDACTED]: Your Honor, if he might come down to
22 use the overhead projector. Marshal, if you don't mind, I'm
23 going to just move this around some. Let me get out of the
24 way.

25 [REDACTED]: [REDACTED] --

1 [REDACTED]: Am I in your way?

2 [REDACTED]: Can you shift just a little bit --

3 [REDACTED]: Oh, that way.

4 [REDACTED]: Or either way. That's fine right there.

5 [REDACTED]: All right.

6 BY [REDACTED]:

7 Q. All right. Let me hand you these transparencies. And
8 if you would -- as I understand, let me give you the numbers.

9 They are exhibits -- defendants exhibits --

10 [REDACTED] -- and if I may give them all at one
11 time and tender them if there is no objection.

12 [REDACTED]: No objection.

13 [REDACTED]: Okay. They are Defendants' Exhibits

14 [REDACTED] -- [REDACTED]

15 [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED], [REDACTED]

16 [REDACTED], [REDACTED], [REDACTED], and [REDACTED].

17 And, Your Honor, we would tender those at this
18 point.


19 THE COURT: They are admitted.

20 [REDACTED]: Let me put them all over here. But
21 let me, if you would, pull from those, [REDACTED] the --
22 I'm in everybody's way here. Let me -- let me just get out
23 of the way, that's the easiest thing.

24 BY [REDACTED]:

25 Q. Pull from those, if you would, those transparencies that

1 show your inspection of the vehicle. And if you would
2 describe for the jury the photograph and what the photograph
3 showed you, in terms of your reconstruction of this accident?

4 A. Okay. The first couple of slides would just be the
5 overview of the vehicle, this is the front of it, this is No.
6  Of interest here is the general damage pattern of the
7 vehicle, but there's a significant impact at the left front
8 fender involving a motion that's both with respect to the
9 vehicle now down and from the left toward the right.

10 You also get just an overall perspective of the
11 damage pattern of interest here or of some significance is
12 the fact that the front bumper has been, for most purposes,
13 just simply knocked off by the impact. It's laying on the
14 ground. I put it in front of the vehicle, but it's just
15 lying on the ground.

16 Viewed from the left rear quarter panel you can see
17 that the frontal impact has involved the roof and the
18 windshield pillar and that there's some damage on the rear
19 quarter panel related to the overturning.

20 Come around to the other side, this is the right
21 rear quarter panel. We can get an idea of the right side
22 damage. It's not as much deformation as the left side is,
23 but there is still deformation present. Just a straight on
24 to the rear view, you can see a little bit of the overall
25 deformation of the vehicle, but it just gives you a

1 perception that the damage is mostly on the sides and except
2 for what I showed you in the left front.

3 Now, in examining the vehicle on the right-hand
4 side, there are a couple of things that are of interest, and
5 we'll get the details in another slide in just a moment. But
6 in examining it there are a series of scratch patterns or
7 patterns of ground contact that I can show you in a closer
8 view both on the panel; that is, behind the back quarter
9 window and on the door frame, the frame of the window at the
10 driver's -- right front passengers door and on the -- on the
11 windshield pillar.

12 Of interest here also is the way the hood is
13 deformed. The hood is deformed over the right front fender
14 and, in effect, sticking out over the fender, indicating that
15 it did not, after that hard impact deforming the hood, didn't
16 have a hard impact on the ground with the right side.

17 I talked about a moment ago about the right door
18 window frame. I may have to step in front here a moment.
19 I'm speaking of the frame around the door window. It
20 ordinarily matches fairly well with the body opening and that
21 closes in that and seals up the window opening.

22 At this point you can see that it's been pushed
23 downward. The significant thing on here is the scratch
24 patterns. When the vehicle rolls on the ground it will leave
25 a scratch pattern. It will give you an indication of the way

1 the vehicle moved with respect to the rock that scratched it,
2 and the thing that is helpful here in understanding what's
3 going on is that we have scratch patterns that are basically
4 perpendicular to the molding which would be up and down on
5 the vehicle at the time it was straight.

6 And then as you look closely at the molding again,
7 there are marks that are more vertical to the vehicle here,
8 here, here, here, all down the shape of that molding, which
9 basically indicates that it got one set of scratches during
10 one ground contact that deformed the frame and a second set
11 of scratches after the frame was already deformed when it hit
12 the ground again.

13 Oh, just a quick look at -- at another set of
14 scratches. They are on the frame around the rear quarter
15 glass, which doesn't move. These are all in a basically
16 vertical orientation here. In other words, those marks,
17 since that frame didn't deform, the marks stayed vertical.
18 That was No. [REDACTED]

19 And here is No. [REDACTED] which closes in on that.

20 Q. He wants to move the microphone over so -- you don't
21 need to speak into it but you need to speak near it. It's in
22 the line of fire there. Okay.

23 A. There. But anyway, here are the scratch patterns that
24 you can see are basically vertical on the vehicle in that
25 quarter panel. And of some interest as you go through it is

1 that there are some scratch patterns in the folds of the
2 steel, that will be shown in a better view in a moment.

3 But if the vehicle is scratched while the steel
4 panel is intact, and then the steel panel is folded or
5 buckled or crushed, that's an indication that there were two
6 contacts there.

7 Or if the buckled portion hides or prevents contact
8 that means that the buckling happened before the scrapes. In
9 this instance we have scrapes within the buckles just
10 indicating that there was a ground contact and then more
11 deformation.

12 We come to the left side. There are a couple of
13 things that will be relevant here. First of all, I'll be
14 dealing with the damage pattern on the side of the door, the
15 door and the window frame and the roof rail.

16 Now, secondary is the damage pattern on the front
17 fender and hood. A minor -- a relatively minor contact is on
18 the rear, and that's a relatively light contact. Part of the
19 tipping of the vehicle when it rolls over.

20 But this shows the left side of -- what I'm going
21 to be looking at here is the scratch pattern around the
22 handle and around on the frame and the side rail, and we'll
23 eventually get to the roof and the bulge in the door.

24 The door is pushed outward. All right. Then,
25 again, of course, we'll deal with the left front corner.

1 Well, this is a view of the driver's door, and with close
2 examination, the marks again are basically up and down on the
3 door, and in particular in the area of the door handle. This
4 is a plastic handle. Actually, it's one of the pieces that I
5 found at the accident site when I was there. It's a lift
6 handle and that lift handle was broken off in an upward
7 direction. As the vehicle traveled across the soil some part
8 of it got under it and lifted it and broke it off.

9 At this point the handle is not present, mostly
10 because it's in my pocket at that time, but the damage or the
11 scratch patterns on the door around the handle are of an up
12 and down nature, and, of course, the damage to the handle
13 indicates that the surface, the stone that made that mark was
14 going from down on the door to up. I'll get back to that in
15 a minute.

16 There are also scratches on the bulged part of the door that
17 we'll get to in a minute that show a secondary contact there.
18 Looking at the corner of the pillar, what we'll call the
19 C-pillar, it's the A, B, C, it's the third pillar on the
20 vehicle where it attaches and joins at the roof.

21 Q. You better explain that. You better explain what A, B,
22 and C?

23 A. In the automotive industry, we name the pillars by
24 alphabetical -- the windshield pillar is called A, A-pillar,
25 then the one that's by the back of the front door is called

1 B-pillar, and the one further back is a C. And if you happen
2 to have something like a station wagon you'll have a
3 D-pillar, but it's the back most pillar is what I'm looking
4 at on this vehicle. This would be the area where there would
5 be a B-pillar and is.

6 What I'm looking at here is the fact that we've got
7 deformation, first of all, scrapes going up and down on the
8 vehicle. But we've got deformation of the roof where the
9 scratches are already over the panel. And then the roof is
10 further deformed indicating a secondary contact there.

11 I've got another photograph that will detail that a
12 little better, but it's helpful to get an orientation of back --
13 the scraping that's present in the area of the roof panel and
14 the joint just above the pillar is first of all present on a
15 fairly smooth panel and then later somewhat protected by the
16 folding and deformation of the impact indicating a secondary --
17 at least a secondary contact.

18 You also see here that the hatch glass in the case
19 of the back window has been broken out. Here you can also
20 see that the -- the sun roof opening, the opening for the sun
21 roof is present, and you can see the big rubber gasket that
22 helps to seal that.

23 When you look at the right side, one of the things
24 that I can observe that helps us understand what -- how the
25 rollover trip -- or how the trip commenced was that the tire,

1 the tire at the rim, the junction between the tire and the
2 rim, will be exposed to soil and grass, and in this case
3 that's exactly what we have.

4 There is a small amount of soil and grass caught in
5 the bead seat. That doesn't sound like it's very important,
6 but the only way that will occur is when the tire is under
7 very high side loads so that the ground contact is pulling
8 the tire away from the rim and also that a gap is created.

9 If there's enough pull, it may actually unseat the
10 tire. But in this case it pulled hard enough and while it's
11 doing that it's pushing the soil along, that soil fills up
12 that gap and then when the vehicle finally releases, it traps
13 grass and soil in that bead. What this tells you right here
14 is that that's the grass that was trapped at the moment the
15 vehicle began to trip.

16 And what it tells me is that this is the leading
17 side tire in the rollover, it's the one that's digging the
18 deepest rut first. This is the right front tire. Again the
19 right front, and here -- it doesn't work out so well. What
20 you're seeing here is the grass standing out in the bead, and
21 it isn't a very clear transparency, but it also shows what I
22 was referring to on the hood, that the hood by the
23 deformation on the left side has been pushed out over the
24 fender and just has the lightest of contacts causing a small
25 amount of deformation in the corner. It's not a hard contact

1 after that.

2 And that also shows you that the front bumper was
3 completely removed at this stage. This is No. [REDACTED] straight
4 into the front. And I've gotten up close enough just so that
5 you can see the bumper is laying on the ground at the bottom.

6 The bumper attachments are here and here, and the
7 bumper itself has been pushed off by a force from the left
8 side pushing it toward the right, which will relate to the
9 overall impact across this corner being the left front corner
10 of the vehicle.

11 Now, the left front corner is of some interest in
12 determining the direction again. What we've got here is
13 we've got deformation of the whole panel, the fender -- yeah,
14 the fender and the hood are pushed in and down, but it's
15 difficult to tell anything on first look except that the
16 scratch marks and the direction of the forces applied are
17 somewhat diagonal to the vehicle.

18 But if you look closely, there are holes that have
19 been punched in the steel by some of the structure
20 underneath; in other words, a bolt has actually pushed a bolt
21 through the steel of the hood, and that steel portion that's
22 been punched through is folded back, which will indicate here
23 that the scratching object was moving from left toward the
24 right; in other words, from us away from us diagonally across
25 the hood. This is part of the process of determining the

1 directions.

2 If we're looking a little more square at the fender
3 and you can see the direction of the scrapes going off the
4 fender, from the left toward the right and toward the back of
5 the vehicle a little bit. That damage also matches up with
6 what's on the -- on the windshield pillar and roof.

7 Of some interest here, and we'll get a little bit
8 better detail in the next one, is that there's dirt soil
9 stuffed between that opening of the door and the fender and
10 that's pressed in there by the rollover action.

11 In the process of this all occurring, of course, if
12 you remember, we're just pressing the vehicle across soil.
13 And the soil will tend to fill in wherever it can, it fills
14 up the gap. Some of the grass that's there will catch and
15 snag on, in this case it's the base of the mirror, the mirror
16 itself is knocked off, but the base of the mirror that
17 attaches it catches the grass and holds it. It just helps me
18 to assess direction. That was No. [REDACTED]

19 Let me get this -- so that it's easier to deal
20 with. This is looking down on the top of the vehicle.
21 Actually, you can see my feet there. I'm standing on the
22 back edge of -- or the leading edge of the hatch, just about
23 where the hatch opening or the glass was, and I'm looking
24 down on top.

25 What you're seeing in front, this, of course, is

1 the windshield opening, the glass has fallen because of the --
2 it collapses into the inside of the vehicle. Here is the
3 steering wheel, the upper rim, here, and if we look carefully
4 down into here, there's parts of the seat, we have better
5 shots, of course, you can see the passenger seat and part of
6 the driver's side seat.

7 What we're looking at here though is the rubber
8 gasket around the sun roof opening. That's the water sealer,
9 and we're seeing how the left side frame -- left side roof
10 rail has been scraped and, in this case, pushed from the left
11 toward the right.

12 The roof itself should line up more with -- with
13 the way the pointer is now, and you can see that it's pushed
14 over and that correlates with what you see in the front view
15 also. The shape of the opening, in this case you can see
16 some of the scrapes that go through the folded metal here and
17 up here. They actually go down through the folds and then
18 the metal is folded to protect it from later scrapes.

19 Perhaps the most significant observation here,
20 however, is the door opening. If I were to connect the
21 original door where the window would come up, it should run
22 about where I've got the pointer held now, and you can see
23 that the upper portion of the door sill, of the -- let's call
24 it the window sill of the door has been pushed outward by
25 several inches.

1 Part of what you're seeing here is the plastic
2 upholstered material that covers that over. It sort of fell
3 down inside. But the red part is the painted part of the
4 structure of the door that's been pushed out and ordinarily
5 that's quite straight.

6 Here I'm closer. This is the windshield again, and
7 I'm closer to the point where I can actually just see from
8 the left side of the header of the windshield and the sun
9 roof opening, you can see that space between there, and there
10 are scrapes that continue all across the pattern, all across
11 the panel.

12 This just repeats again what I was saying about a
13 relatively uniform scrape across the surface followed by the
14 deforming.

15 There we're looking at a back portion. This is the -
16 this is No. [REDACTED]. There is the corner of the sun roof opening
17 and here is the hatch opening with some of the hatch glass
18 still on the sealer. This is the panel, the part of the roof
19 that's between them. And again the scrapes go through the
20 folded part, indicating one ground contact when the roof is
21 fairly intact and another with the the side rail deformed.

22 Just to get a look at the right-hand side as
23 comparison, standing up over the vehicle again looking down,
24 now we see a relatively straight door. This one turns out to
25 be the way it should be, straight -- straight from the top

1 looking down and undeformed from interior contacts. But we
2 do have a substantial movement of the -- now, this is the
3 right roof rail due to ground contact here again, and if we
4 look carefully, I'm trying to find the -- okay. The window
5 frame, the window frame we spoke of is actually out here,
6 it's out -- actually, just outside of the shape.

7 If you're looking at the door only you only want to
8 look at this part. This would be the lock button, the little
9 tab that you pull on to unlock the door. I think this might
10 be easier to look at if I turn it this way. Going back to
11 the -- this is No. [REDACTED]. We've gone back to the sun roof
12 opening, and now I've pulled off the gasket. You remember
13 the black gasket that goes all the way around the opening,
14 I've pulled it back and it's not bonded or screwed down, it's
15 just sort of slipped over, held over the -- a flange there
16 that allows it to stay in place.

17 Q. [REDACTED] that's been called a molding here as well.

18 Is that the same thing? Would that be another term?

19 A. It might be. It's a rubber gasket is what it is. You
20 might think of it as a molding, but moldings are usually
21 harder. This is a very flexible soft rubber molding, gasket.
22 Molding, okay.

23 But that thing is designed to slip over a rim on
24 the flange that's in there and hold it in place and hold it
25 vertical and place it. The thing that you observe here, and

1 this is on the driver's side roof, here is the driver's side
2 door, what we see here is that locally the flange itself is
3 deformed.

4 Ordinarily, that flange bends up in a soft radius
5 and is quite straight in this area. Locally, now you can see
6 that something has caused it -- interior contact has caused
7 it to be deformed from the right toward the left in what
8 somewhat of a circular shape of the deformation.

9 Q. I don't want to interrupt you, but when you say from
10 right to left, what -- as viewed by the driver, is that what
11 you're saying?

12 A. Yes. Yeah, if the driver were -- we don't want to worry
13 about the -- when I speak of right to left I'm usually
14 thinking of in terms of the driver's orientation; in other
15 words, from a driver's right toward the left. The force that
16 performed this -- this particular steel molding was from the
17 right to the left, and it caused a circular impression in
18 that steel.

19 And then just an overview of that, I was in close
20 on it there, just to back up, here is the overall picture and
21 this didn't come out quite like I -- as clear as I hoped, but
22 the deformed segment is right about here just about in the
23 middle of the opening, the fore and aft point of the opening,
24 and it's a deformation of something a half an inch or a
25 little over, but this gives you an orientation of where that

1 is and the force that did it came from somewhere in the
2 middle of the vehicle and crossed into that rail. That was
3 [REDACTED].

4 That's -- well, I think a couple of these are out
5 of sequence now because I've got a couple more interesting
6 things and then I --

7 Q. I probably shuffled them. Go ahead and --

8 A. I think I've got it now. Let's see if this will work.
9 Let me orient it so it's like the last one. In this instance
10 I've set No. [REDACTED] so that the front of the vehicle is up in
11 the air and the drivers steering wheel is at the top of the
12 picture here on the right.

13 What we're looking at is the opening of the door
14 window now on the driver's side. You can see I've got the
15 rubber gasket back in place here, but the door opening is of
16 some importance here. What you see is the door itself is
17 deformed by contact high on the door, not down in the area of
18 the -- we can just see it here, the arm rest which now is
19 covered over by the end of that plastic trim.

20 But the arm rest is relatively undeformed whereas
21 the structure of the door that is deformed, is what I'll call
22 the window sill part of the high part.

23 And just to close out the observations on the
24 vehicle, this is a view of the interior. And I'm looking
25 back through the hatch, from the hatch toward the front. And

1 I've done one thing to try to illustrate the movement of the
2 seat, I've reclined it. I've reclined it so that you're
3 almost looking straight down the back into the seat cushion.
4 This is the cushion of the seat and the fabric pattern here,
5 the sort of a -- I don't know, I guess you call it a plaid
6 kind of a pattern, is what's in the center of the seat
7 section.

8 The seat itself has a head restraint, which is
9 here, and you can see a little bit of the shape of this
10 structure. But what you do see here are the, what I'll call
11 wings, on the seat. These are the things that fit in where
12 they used to be able to fit in pretty well, just above my
13 hip. That's for a restraining, not a restraint, but provides
14 some amount of positions for the driver or any occupant.

15 But what it does is that's centered in the regular
16 undamaged vehicle. What we see here, though, is that that is
17 moved toward the left by a dimension of possibly two to three
18 inches. And when you look at the seat, it's a movement of
19 the entire back portion of the seat, the part that reclines
20 and moves forward and back, that whole thing is pushed
21 sideways, it isn't just bent over, the whole thing is
22 sideways.

23 That's an indication again of some force on the
24 seat that is pushing it from the driver's right side of the
25 vehicle towards the left. That pretty much summarizes what I

1 was able to see when I inspected the vehicle.

2 THE COURT: Is this a convenient stopping place?

3 [REDACTED]: Yes, sir, Judge, would be, thank
4 you.

5 THE COURT: Let's take about a ten-minute break,
6 ladies and gentlemen.

7 (Whereupon, a brief recess was had.)

8 THE COURT: Bring in the jury.

9 (Whereupon, the jury was brought into the courtroom, and
10 the following proceedings were held in their presence.)

11 BY [REDACTED]:

12 Q. Thank you, Judge. [REDACTED], during the course of
13 your explanation of your scene -- I mean your vehicle
14 photographs and so forth, you mentioned scratches that
15 indicate direction and so forth.

16 Can you -- I notice you've got a little car there.
17 Will you show the jury, if you would, the significance of
18 those markings to you in terms of your reconstruction?

19 A. Well, first of all, there are two things that I try to
20 assess in terms of mark direction, mark location and mark
21 direction in a rollover situation. One of them is which way
22 was it going?

23 If you consider a rollover, you're trying to
24 determine which side of the vehicle was leading when the trip
25 began. That just means it's either the passenger side

1 leading or driver's side leading. With the passenger's side
2 leading, when the vehicle strikes the ground, the scratches
3 are going to be made in one direction. If it's the other
4 way, the scratches will be the opposite direction.

5 And the way to determine that is to consider when
6 the vehicle rolls over, it's going to roll over a scratching
7 object that's stationary. So when I look at a rollover
8 situation, I pretend my finger is the scratching object. If
9 I roll, as I'm going to do now, with the passenger side
10 leading, this is the -- I'm holding the back of this car, the
11 passenger side leading would tend to cause a scratch that
12 would start at one point where I've got the tail of this
13 arrow and move toward the head of the arrow. So the
14 scratching object would touch the vehicle and move in the
15 direction that I have shown this arrow.

16 When you look at the vehicle then, you see that
17 some part of it has been moved from a high position to a low
18 position on this side or along this arrow. That tells us in
19 that direction that this was a passenger side leading roll.

20 In this instance, in the case of this vehicle, all
21 of the artifacts of the scrapes on the vehicle correlate with
22 the passenger side leading, both the right side contacts and
23 the left side contacts will all support and they basically
24 just run around the vehicle in a circular pattern, they all
25 support a passenger side leading roll.

1 And, of course, the tire marks at the scene support
2 the same thing. But, in addition, what we can do is we can
3 assess the fact or see again the fact that the contacts are
4 telling us that there are more than one ground contact here.

5 On the right-hand side I already mentioned the
6 scrapes on the door's frame, door's window frame that
7 indicates there are two ground contacts there, one during one
8 roll and another time scraped against that same area.

9 On the left-hand side, we have a little bit
10 different story, in that it's on the trailing side, it's the
11 one that's behind. And it tends to have some other kinds of
12 damage associated with it.

13 We see three basic different kinds of damage on the
14 left-hand side, one is the basic scrape that goes from low to
15 high, like I showed you on the seat pillar and on the frames
16 of the roof. The other is the damage across the hood on the
17 left front corner coming from a low position and up and over
18 the hood and toward the right and the back. And then there
19 is an additional scraping on the door where the door has been
20 pushed out.

21 In other words, it's the second scraping of the
22 driver's side door is local only to the part that's bulged
23 out. So all that -- what that has told me so far is that
24 what we've got is at least one relatively modest lateral
25 contact, the one I've talked about that probably did the soft

1 scrape on the roof followed by at some point a hard impact of
2 the left front corner.

3 I've got to turn it around because we're going to
4 come passenger side leading, a hard impact in this direction.
5 And if you'll you recall the diagonal marked pattern requires
6 it to be moving at an angle, this is the biggest impact
7 because it shows the most damage to the vehicle, and it also
8 corresponds with the most interior contact damage that we
9 see, the door, so the corner damage on the left front induces
10 the occupant contact damage on the door pushing it out so
11 that at a later time during the rollover that scrape only
12 touches the bulged part of the door.

13 It, in fact, protects the other parts. What this
14 does is help me, like I said, to assess the direction and, in
15 this case, now, we're getting a read on the numbers. The
16 next step is to go to the scene and see if the numbers can be
17 supported at the accident site.

18 Q. Now, did you, in that fact, do that and made some
19 transparencies as well of your inspection at the scene?

20 A. Yes. There are two things that came out of the scene
21 work. One is the photographs that I took where we placed the
22 little flags down where I found all the pieces. And then the
23 map that -- excuse me -- the map that resulted when the
24 surveyor measured the location of those flags and put them on
25 a diagram.

1 Q. Maybe before you come down, while you've still got your
2 car, have you -- did you draw any conclusions as to -- you
3 said a passenger side roll -- as to the number of rolls?

4 A. Yes, yes.

5 Q. And would you explain that to the jury, please?

6 A. Well, in this instance the car damage says it has to be
7 three, and because we know it's also found on its roof at the
8 end of the crash, that means three and one-half. But the
9 question still has to come back and say, is that -- is the
10 scene going to support that.

11 Now, it does, but we'll have to go through the
12 process of getting it there. But it did -- the damage on the
13 vehicle calls for three and one-half rolls in this instance.
14 It calls for three and, of course, we know it ended up on its
15 roof.

16 Q. Just again, I think the jury understands what a complete
17 roll is. What do you mean by a complete roll?

18 A. I'm speaking of, if we start with wheels down, one roll
19 is complete when wheels are down again, and when you see the
20 diagram I've prepared, I've shown vehicles in the wheels down
21 position. It's just a regular box. But when I have the
22 vehicle shown in the wheels up position, I also draw an "X"
23 through it so that you can spot when it's wheels up or wheels
24 down. One complete rollover is wheels back down again.

25 Q. And the half, it means it just -- it ended up on its

1 roof?

2 A. I'm sorry?

3 Q. The half just means it ended up on its roof?

4 A. Half means it's on its roof because if it had gone four
5 rolls, it would have been wheels down. And the fact that
6 it's on its roof afterwards means there's got to be another
7 half roll measured.

8 Q. [REDACTED] I believe I've already identified the scene
9 transparencies initially?

10 A. Yes.

11 [REDACTED] Judge, if he may come back down.

12 THE WITNESS: All right. We've got two photographs
13 that just show us the roadway. They show the roadway in sort
14 of a general layout, and this one is looking back towards the
15 direction the vehicle came from. The Nissan would have been
16 driving toward us, and the turn -- I'm standing at the
17 shoulder of the road in a turn which is the turn that we'll
18 see on the diagram.

19 The next photograph I'll just simply turn in place
20 and look the other way, but this shows you that there's a
21 fairly straight stretch approaching and then there's a turn.
22 In this case the vehicle is moving a little bit to its left
23 in a leftward turn.

24 Now, if I just turn around and look down the road,
25 you can see that the road continues in that leftward turn.

1 This is sort of a view of a person facing the direction the
2 car was going. And you can see the road bends off to the
3 left, and it's hard to see in the picture, but it's a very
4 shallow downgrade. Also, it's going a little downhill as we
5 go around the turn.

6 You do and can see that the road is banked a little
7 bit as you do for turns, you bank it a little bit so that
8 it's easier to drive around, more comfortable. In the middle
9 of the road is a double yellow line, and I think you can see --
10 well, I'll have to move a little closer, there are some
11 reflectors that are placed between the -- between the double
12 yellow line at fairly long intervals.

13 But in this picture I can't see -- but I can see
14 that there's one here and there are a number of reflectors
15 and they are shown in a couple of the other photographs that
16 were present all the way back to the time of the accident.

17 Now, if you look at the shoulder on the left, you
18 can just see a little bit of yellow, maybe flowers or
19 something, those are the little yellow flags that are on the
20 wires that I placed there, so what you're seeing is the
21 roadway as eventually the vehicle went off to the left and
22 made the marks in the ditch on the left where the yellow
23 flags are. That was [REDACTED].

24 I come up a little closer -- it was raining that
25 day, the roadway was pretty wet, but we were able to get it

1 finished. You come up a little closer, you can see the
2 ditch, there's water running in it, a little bit, anyway, but
3 what you can now start to see is is the yellow flags I've
4 placed to identify three tire paths that I could find when I
5 was there.

6 After we trimmed the grass down a little bit, you
7 could physically walk, go through the place with your hands
8 and you could feel the depressions of the path of the tire as
9 it went through and tore up the grass that was originally
10 there. Some of it has grown back, some of it has not, but
11 you can feel where the depressions are.

12 Now, what we did -- this is going, looking from the
13 ditch back onto the roadway, what I did was to the extent I
14 could feel those things, I placed the yellow flags down and
15 had the surveyor locate them on a map. You see three because
16 that's -- those are the three marks that the vehicle will
17 make that are most visible. There's a fourth one in there
18 somewhere, but I couldn't feel it, it was just too light.

19 But that's what you'd expect as the vehicle yaws
20 around in this kind of turn, the inside rear tire is going to
21 be the lightest and it won't leave as visible or as deep a
22 track. But what these do is they show me how the vehicle
23 comes into the ditch, and it in effect strikes the back side
24 of the ditch.

25 You can picture it comes down the slope of the

1 ditch towards the bottom, but then the back side is there and
2 that begins to encounter the front of the car, and that's
3 where the vehicle actually initiates the tripping mechanism.
4 When it strikes the far side that's where the front tire digs
5 in and gets that grass and dirt behind the head seat and
6 initiates the trip, so in between these marks, that's where
7 the vehicle begins to rollover. That one was [REDACTED]

8 What you're seeing here is I'm standing in the --
9 toward the end of where I found all the glass marks, the
10 glass splash, and you're looking off in the distance, you can
11 see up at the top of the image three tire paths where the
12 vehicle came off the pavement and came into the ditch and
13 began to trip.

14 Here is a segment -- a collection of the flags that
15 locate the first glass that I could find at the site. This
16 is tempered glass from the side and sun roof and back glass
17 of the vehicle, and then in the foreground of this picture
18 where some additional -- some more glass debris was found.
19 But what it gives you a perception is that it's a fairly
20 straight path coming, once the vehicle starts to trip it just
21 tumbles down that ditch towards you.

22 I'll come back to this in a little more detail in a
23 minute, but this is -- this is the location, I'll call it the
24 two and a half roll position. It's a location about 60 feet
25 from where the vehicle came to rest, 50 to 60 feet from where

1 the vehicle came to rest where there's an indentation in the
2 ground today. Part of what I found when I was there is a
3 piece of a reflector that's in that -- in that indentation in
4 the ground. It's been there in some early photographs where
5 it's located.

6 When I talk about an indentation it's not just a
7 little bit of a thing, it's a deep hardened area where the
8 clay has been pressed very hard by impact. But I'll come
9 back to that again in a moment, because I placed two flags on
10 that. That is a reference for what I call the two and a half
11 roll position. And here is just an overview.

12 We're standing just behind where the vehicle came
13 to rest. The rest point is about where -- there's a little
14 yellow flag down here, it's in this vicinity in the bottom of
15 the ditch, basically crosswise to us with the front of the
16 car facing the woods. And you can see some of the character
17 of the marks and the debris that followed from where the
18 vehicle left the road and came to this spot. That's pretty
19 much the scene work.

20 After this, the detail of those -- those locations
21 as added to the survey drawing we'll begin to look at what
22 that means in terms of the motion of the car.

23 Q. All right, sir. Did you -- if you'll go back,
24 [REDACTED], thank you. Did you have available to you the
25 accident report that Trooper [REDACTED] filled out for this

1 accident?

2 A. Yes, that was one of the first things we got, yes.

3 Q. Would you explain to the jury how you used that report
4 in connection with your reconstruction and your inspection of
5 the scene?

6 A. Well, of course, that's the first record of what
7 happened, and it's -- it's the hard -- to the extent it is
8 hard, it's hard facts about what did occur. He made some
9 measurements. He made some observations, and I wanted to be
10 sure that the analysis that we make includes all that as
11 information that's relevant to what happened here that day.

12 Q. And --

13 A. So I compare what I can find against what he observed,
14 and worked toward correlating the two.

15 Q. All right. You mentioned also that you had a -- that
16 you had a surveyor with you. Did you, at your direction, was
17 a survey done at the scene of the accident?

18 A. Yes, sir.

19 Q. And would you explain to the jury just quickly why you
20 did that and what was done?

21 A. Well, we talked about how sometimes the best way to
22 analyze these things is to make a map and figure out where
23 pieces are and try to put it back together. Reconstruction
24 is putting it back together, so I used the map as the basis,
25 the framework in which to put this thing down. If you're

1 going to do something dimensionally, the map offers us the
2 quality scale representation of the scene.

3 Q. Let me show you what's been identified as Exhibit [REDACTED] and
4 ask you if you recognize that, sir?

5 A. Yes, I do.

6 Q. And what is that, sir?

7 A. This is part of the state -- you know, this part of the
8 roadway is in [REDACTED] and this is part of the state's map of
9 the scene. It just generally shows where the curve is and
10 where some other roads are nearby.

11 [REDACTED]: All right. We tender that.

12 [REDACTED]: No objection.

13 THE CLERK: What number was that?

14 [REDACTED]: [REDACTED]. [REDACTED].

15 THE WITNESS: As a reference, there's an arrow
16 pointing generally to the area where the incident occurred.

17 BY [REDACTED]:

18 Q. Now, what did you do with the survey that you had made,
19 [REDACTED]?

20 A. Well, the surveyor offered or provided us at our request
21 the survey in what we'll call an Autocad format. It's a
22 little computerized drafting format so he can just send us a
23 disk, a computer disk and we can load it into Autocad at our
24 place and then add on top of that our vehicle positions so we
25 just electronically had the vehicle positions right on top of

1 his map. It doesn't destroy his map or anything, we just put
2 those things on top.

3 That was the next --

4 Q. Did you have that -- the document that you produced here
5 in the courtroom?

6 A. Yes.

7 Q. All right.

8 [REDACTED]: We're going to need something to --
9 it's fairly long, [REDACTED]. Maybe this -- let me push it
10 far enough so that you all can see and the Judge can see as
11 well. Is that -- all right. This is Exhibit [REDACTED] Judge, I'm
12 sorry, I should have -- which we tender at this time.

13 [REDACTED] No objection, Your Honor.

14 THE COURT: It's admitted.


15 BY [REDACTED]:

16 Q. If you would come down, please, and explain to the jury
17 what this is and also how you used it in connection with your
18 reconstruction.

19 A. All right. This is an Autocad plot of the survey data
20 with our vehicle template positions added on top. Now, the
21 template positions are placed based on the locations of the
22 flags or the points that I found while I was there.

23 You should consider that this is like a helicopter
24 view. If you were up in the air looking down on top, it
25 allows us to look down on what we call a plan view, so that

1 everything is to scale in the horizontal direction. You can
2 see that the roadway -- and, in particular, the -- we have a
3 magnetic north arrow diagonally on the roadway.

4 The path of travel of the vehicle was on Highway
5 No.  moving from, as you are looking at it now, from your
6 right to your left, and the vehicle was or at least is
7 traveling in the direction that I've indicated, eventually
8 leaves the roadway to its left on the inside of the turn and
9 then trips in the general -- in the area that I have
10 indicated here and then rolls, comes to rest at the last spot
11 or position that's here.

12 These didn't get very bold in outline so you may
13 have to look closely to see the particular vehicle positions,
14 but I've got a number of vehicle positions located all along
15 that path. There's a small driveway here that goes off into
16 a neighbor's farm and a fence line, general -- the general
17 ditch line is a -- what we'll call a phantom line, with a
18 dashed line through it.

19 And then I've indicated the vehicle path, the path
20 of the center of gravity as a blue line all the way through
21 all the way back up to the position I show on the roadway
22 before anything happens.

23 Q. I think you have a car which is not designed to be this
24 vehicle, but just to demonstrate what your reconstruction --
25 would you do this please?

1 A. This is done to a scale of an inch to five feet and it
2 turns out that this little match box car is about the right
3 size. If I place it over the template shape of the vehicle,
4 it pretty well fills up the box. So if we would just pretend
5 that this is the Nissan it would probably give us a fair
6 explanation of what's going on.

7 If you look at the front, there's a little bit of
8 chrome on the front and I'll try to keep the front identified
9 as we go. What we had when we got to the scene were the
10 three tire marks in the ditch. They don't quite go up to the
11 edge of the pavement because the pavement gets scraped and
12 cleaned up by the road crews, so the engineer -- the pavement
13 sort of was obliterated.

14 But the tire marks or the paths go right up within
15 a couple feet of the road edge and there are three, and I
16 indicated there will be four if there had been a heavier
17 tire. The fourth tire just didn't make a clean mark. It
18 would have been right through here. What this indicates,
19 though, is that the car is already in a side slip.

20 It isn't just driving off the road front first,
21 it's already sliding, in effect, not quite sliding as in the
22 purest of senses, it's in a hard cornering maneuver and it's
23 about to start sliding, and actually as it goes through the
24 soil in the off-road area, it cuts through the turf down into
25 the soil, the gravel and the clay that's beneath that and

1 digs a rut. And that's what actually piles up in front of
2 the tire.

3 Some of it is thrown off as it goes, but eventually
4 that piled up enough to catch in the bead seat as I indicated
5 and send the vehicle into a roll. The roll, the end of the
6 marks, indicates when the roll begins, the marks quit at this
7 vehicle position.

8 And that means the car has already rotated very
9 nearly broadside, not quite, but very near to broadside so
10 it's just digging ruts in the off-road area, and you can see
11 also that the front tires come up on the far side of the
12 ditch bank a little bit and that initiates or triggers the
13 tripping mechanism.

14 The next bit of information about the vehicle is
15 down here at this next vehicle position. I've shown it
16 upside down here, but this is the first spot I find any
17 glass. That -- that has involved a lot of careful walking
18 and looking and hands and knees digging in the mud until we
19 get here, which is where the first glass is found.

20 The glass can be identified as to which source it
21 comes from, because in this particular vehicle side glass has
22 a certain thickness and it's tinted without any other
23 treatment. The hatch glass, for instance, is a considerably
24 thicker glass because of the shape of it, and it has the
25 defogger grid on it, and it has paint around the edge, so it

1 can be identified quickly.

2 The sun roof is the thickest of all the glass and,
3 in addition, it has a coating on it which is like paint but
4 it cuts -- it's used to cut down on the sun load coming
5 through it. It's not tinted, but it's got a lot of little
6 spots of paint on it that prevent the sun from coming through
7 full, so you can identify that also. And then the rear
8 quarter glass, you remember the quarter glass is the glass
9 just behind the -- for the back seat people, that glass that
10 doesn't move, is further, just like the front door glass,
11 except that all around its edge it has a black painted area
12 where it's bonded in. The black is just to prevent you from
13 seeing the bonding, the glue from the outside. It's an
14 appearance thing, but it tells you what piece of glass you
15 found.

16 So what I did is as I went through this, I measured
17 the various pieces of glass with a microcrometer to find out
18 which thickness they were, and I was able to identify
19 initially the first thing we see is the door side glass. But
20 within about five feet or six feet we find sun roof glass and
21 toward the road a little bit in another five feet we've got
22 the rear hatch glass.

23 So basically on that first landing we're breaking
24 side glass, sun roof, and hatch, at least that, and then we
25 go on and find more glass along the way.

1 The one thing that happens once the glass -- let me
2 back up just a quick second. We're dealing -- each of the
3 pieces of glass we're talk talking about here is what we'll
4 call tempered glass. It's not like your windshield, which is
5 two layers of glass with a plastic inner layer. It's a heat-
6 treated glass for high strength. But in doing that, there's
7 a number -- there's stresses induced in the glass so that it
8 is very strong.

9 But when it breaks, it breaks in, let's say, a
10 million little pieces. It comes out all in pieces that are
11 the size of a large pea, let's say, but they are very sharp
12 edges, rectangular or actually crystal shaped. But each time
13 they break, you can find the original thickness segment
14 because that's the most regular face and we'll check against
15 the drawings for all that.

16 But in all of this stuff I wasn't able to find any
17 windshield fragments at all. I found all kinds of tempered
18 glass and it all measured against the specs for this vehicle.

19 As we go along, we reach the spot that I called the
20 two and a half roll position. I'll come back and do the
21 dimensions on this in a moment, but at the two and a half
22 roll position that's where basically I can't find any more
23 glass from there to rest. That doesn't mean there wasn't any
24 at all, but by this time we're going down into the ditch
25 again, down into the bottom of the ditch, and there's a lot

1 of water that comes through, soil moves around, it tends to
2 start to wash that stuff a little bit.

3 The locations we found early were fairly
4 concentrated, there was a lot of glass in local areas. That
5 means, basically, that the glass broke when it struck the
6 ground there. Obviously, all the glass doesn't fall right
7 there, it gets carried with the car some, and that's why the
8 spray pattern that goes with it goes almost basically just
9 past the two and a half roll position.

10 If you look at the evidence here at the site, now
11 we have trip, you have the first breaking of glass which
12 means that the roof is essentially down, maybe not flat down,
13 but essentially down. Then we have a distance that is
14 covered to the place where we have the hard impact on the
15 ground with the left front corner of the vehicle, upper
16 corner -- that means because of this distance that we should
17 have had another roll in between, and there's a fair
18 concentration of glass again here. And this is also a spot
19 where I find the first -- what I'll call quarter glass,
20 remember, the non-moving glass for the rear passenger is
21 found on the ground here for the first time.

22 I can't say that's the very first time. That's the
23 first time I can find it with the paint on the edge. And
24 then we've got an impact against the ground here at the two
25 and a half roll position and then the vehicle simply goes

1 another distance rolling along the bank and somewhat down the
2 ditch to where it comes to rest again on its roof.

3 Q. [REDACTED], what are the distances, can you tell -- can
4 you use the survey to take the jury through the distances
5 involved starting back up on the highway up through the point
6 of rest?

7 A. Let's go backwards.

8 Q. Okay.

9 A. Just to make it more difficult. The rest position is
10 identified by the officer somewhat fairly well and by the
11 people at the site. Basically, it's down in the ditch close
12 to the roadway on it's roof. If we come back to the trip
13 point, I can observe that the -- now, I have, as an engineer
14 trying to deal with this as a particle in this kind of a
15 situation, so I look at where the mass center or the center
16 of gravity is at trip and where it is at rest. And that's
17 the distance that is important in physics or important in
18 determining speed loss.

19 That's 176 feet, from the trip point to the rest
20 point. And that's identified by the end of the tire marks
21 and the location where the vehicle did come to rest.

22 The next dimension that I look at in terms of
23 trying to assess speed loss is where the mass center was when
24 it first left the pavement. I have to -- I realize that some
25 tires are on the pavement and some are on the soil, but we'll -

1 they will carefully average to the mass center activity here.

2 We've got another 74 feet of mass center movement
3 or CG movement to the point where it came off the road. On
4 the pavement now there's another 74 feet and some inches, a
5 little over 74 feet from where the vehicle left the roadway
6 until the position where tire marks were first observed at
7 the site near the center line, center line of the roadway.

8 This is -- it's a spot where the car, this Sentra
9 first made observable or measured tire marks because of the
10 yawing. When you are in a hard steering maneuver like this,
11 the vehicle leaves tire marks because it's trying so hard to
12 change direction and the tires are squealing and making noise
13 and leaving rubber deposits on the rode.

14 That's what will be -- that's what will have been
15 observed for the first time back here by the center line of
16 the road, and that's identified by the police officer as
17 marks on the pavement. If I go back to the police report and
18 I'm interested in trying to correlate his measurement, he
19 recalls -- he writes 281 feet of off-road excursion is
20 basically what he's talking about.

21 Well, the way to look at that is, if you just add
22 up my numbers I gave you, that's only 250 feet. But I'm
23 talking about mass center. I'm trying to analyze that part.
24 He's measuring what's there. If I take the front tire and
25 drag it back to where it leaves the pavement, we'll come real

1 close to 280 feet to that from that point to where the
2 vehicle is at rest.

3 So now we're starting to tie it all together we
4 don't want to get caught up too much in that because the 280
5 feet will check against what he was measuring which is the
6 off-road excursion to rest.

7 Then I have to back up one more step. When I see
8 tire marks on the pavement I also have to know that, from my
9 vehicle dynamics work, that there was a steering input made
10 to the vehicle before that, and the vehicle doesn't really
11 respond to all that to make tire marks until about, in cases
12 of vehicles like this, about half of a second. It doesn't
13 mean very much, but it's a few more feet. And what it tells
14 me is that hard steering input had to be on the order of 50
15 feet before this, had to be made and in place, which puts it
16 back up now where I'm standing in front of everyone, back up
17 here near where I've shown it near the edge of the road.

18 There's no real indication exactly what happens
19 there, but that if a hard steering input is made up in this
20 vicinity, then a path or course of vehicle can be caused to
21 occur that will lead the vehicle off the road at that spot.

22 Q. Do you have an explanation as to what may have occurred
23 at that point?

24 A. Well, there would have to be some speculation as to
25 which of the three probabilities is the most likely. And

1 I've talked about that briefly. One of them might be some
2 oncoming traffic might have caused her to think about leaving
3 the roadway or maybe did. She could have just simply left
4 the roadway through inattention or there may have been some
5 circumstance here where she thought perhaps she was off the
6 roadway.

7 In any case, a large, too large of a steering input
8 was made, which is usually associated with an avoidance
9 maneuver, an emergency maneuver of some sort. But that
10 happens back up here on the pavement, and all I've done is
11 show it near the edge because I don't know whether she
12 actually might have gone off or not. There is a lip
13 described, but I don't know how to assess whether she might
14 have been off the pavement or not. In any case, a large
15 leftward steering pull is what triggered it.

16 Q. Is there anything else before we leave the survey that's
17 shown there that is part of your reconstruction?

18 A. Eventually I've got speed calculations but we can do
19 that from here.

20 Q. You mentioned some marks that you used, [REDACTED] the
21 so-called -- you mentioned yaw marks. Let me show you -- I
22 think these actually have been identified earlier by Corporal
23 [REDACTED] but they are Defendants' Exhibits [REDACTED] and [REDACTED]. Any
24 objection?

25 [REDACTED] None, Your Honor.

1 ██████████: May I tender them at this time,
2 Judge?

3 THE COURT: ██████ and ██████ are admitted.

4 BY ██████████:

5 Q. All right. And would you show the jury, please, what
6 they are and how you use them in connection with your
7 analysis?

8 A. These are photographs taken on the pavement looking
9 towards the turn. This isn't going to help much, but the car
10 is moving away from the photographer, you can see a man in
11 the distance, and he's making some measurements. That's one
12 of the people that took the photographs. But as you look at
13 the center line, and maybe I can mark it on the photograph,
14 as you look at the center line, there's a residue or a
15 remainder of one of the tire marks in the vicinity of the
16 reflector.

17 If I just -- if I hold my hand -- my index finger
18 is pointing to the area where that reflector is between the
19 two yellow stripes and coming out of -- into that area from
20 the -- from the right of those lanes or the ordinary travel
21 lane for this direction across it and going off into the
22 distance is part of a tire mark.

23 It's now visible over the paint, that's the easiest
24 way to distinguish it here. The reason the tire mark isn't
25 visible as it goes farther away is -- this is some time after

1 the accident and traffic has tended to wear away the mark or
2 to cover it up. But since the center line doesn't get nearly
3 as much traffic on it anyway, that has held the mark a little
4 longer.

5 Q. And did you use Corporal [REDACTED]'s measurements of that
6 mark?

7 A. Well, he had a mark measured, but in addition, the
8 survey locates that reflector, so I'm also able to check that
9 that mark is the right front tire mark that leads down to the
10 point where the mark leaves the pavement. And that helps to
11 position the vehicle as it crosses the center line.

12 Q. Let me --

13 A. That particular mark was helpful in locating where the --
14 where the tire mark came across the center.

15 Q. Before we move on, I know you've also reconstructed the
16 movement of the occupant during this accident. Let -- let's --
17 let me move on, if I could, though, to the speed calculations
18 that you referred to.

19 A. Oh, sure.

20 Q. And if you would, tell the jury how you went about
21 calculating the speed of this vehicle at the various points
22 in time during this accident.

23 A. The speed calculations are run backwards. I suppose
24 that's the way these kinds of things end up going anyway, but
25 you look at it backwards because we do know that we've got a

1 zero speed at the end.

2 If we can assess -- and I've got some data on what
3 the deceleration rate is over a rollover distance on an
4 off-road area, then I can calculate, if I know the
5 acceleration rate, I can calculate the speed that would have
6 to have been present at the beginning of that rollover
7 distance. That's just a simple speed calculation based on
8 deceleration.

9 If I were to do that here, the 176 feet would --
10 176 feet of rollover ending at a zero speed would have had to
11 have start at a speed of between 46 and 56 miles per hour.
12 That means that the spot where the tire marks in the soil
13 end, the vehicle was at 46 to 56 miles an hour. It's a range
14 that has to be used because of the -- somewhat of the
15 variable across soil -- it's a little hard to be exact across
16 soil. If this were an asphalt surface we'd be a little
17 tighter on the range.

18 If you then extend that and just carry that back to
19 where the vehicle came off the pavement, in other words, it's
20 traveled through this soil digging up the soil, and it's
21 increasing in its yaw so the drag factor is increasing, then
22 you'd have a speed of the vehicle at the time it left the
23 pavement of 56 to 68 miles per hour.

24 Now, that's at the time the car leaves the
25 pavement. Now, if you went back, and when the vehicle is

1 making the hard turn on the pavement and leaving tire marks,
2 it's also experiencing path deceleration. That means not
3 only is it experiencing lateral acceleration due to the hard
4 cornering which is what makes you feel like you lean over in
5 the car, it's also being slowed down, assuming that we have
6 the foot off the throttle at this point.

7 But the energy required to make the turn causes you
8 to lose speed, and that's the -- the next factor that I took
9 into account over just the 74 feet of visible tire marks.
10 That would give us a speed at the start of visible tire marks
11 of over a range of 60 to 72 miles per hour.

12 And then you'll remember I mentioned a half-second
13 of input. There's a small speed loss involved with that over
14 the additional about 50 feet and that would bring the speed
15 up at the point up on the roadway, traveling speed between 61
16 and 75 miles an hour. That's what the data tells us.

17 In looking at the roadway, I've also measured the
18 radius of the path that the vehicle appears to have to make,
19 and it appears that it would work quite well on that
20 curvature, if we're in the middle of this range.

21 In other words, the vehicle has a lateral
22 acceleration capability that would allow it to make the path,
23 the minimum path that I've shown and still be on the roadway
24 at about 68 miles an hour.

25 Q. I know you've worked backwards, but let me ask you to do

1 it, if you would, the way -- the other way; in other words,
2 starting on the roadway, with the first speed that you
3 calculated and then working the other direction until the
4 automobile came to rest.

5 A. All right. What the numbers would tell us if we go back
6 to the original way -- the way that you would consider the
7 event to occur, we'd be operating on the highway in the range
8 between 61 and 75. The vehicle would yaw and go into this
9 hard cornering maneuver. At the time it leaves the pavement,
10 it would have slowed to 56 to 67. At the time it trips, it's
11 slowed further to a 46 to 56 speed. And then as it rolls to
12 rest, it will come to a zero speed at the finish.

13 Q. [REDACTED], are you familiar with any testing that has
14 been done that would demonstrate to the jury the principles
15 of rollover and the severity involved at speed -- any range
16 close to where you were talking about here?

17 A. Yeah, there's some research that's been push published
18 and I at least remotely participated in it.

19 Q. And tell the jury what that is, please?

20 A. There was a rollover study conducted in 19 -- well,
21 actually, it was conducted in '68 and '69, and it was
22 published in '68.

23 Q. Where was it published?

24 A. SAE and -- well, the STAPP conference was the first
25 place, I think, that it was presented, but it was published

1 as an SAE paper through the STAPP conference, which is an SAE
2 affiliate situation, but it was first presented there.

3 Q. And what was it? In other words, what was done as a
4 part of this testing?

5 A. Well, it was basically an attempt to come to a better
6 understanding of rollovers, rollover kinematics of the
7 vehicle; in other words, the dynamics of the vehicle in
8 rollovers and the kinematics of the -- of in this case we're
9 using anthropomorphic test devices or dummies in the vehicle
10 to understand the kinematics of the dummies in the vehicle
11 during rollover and to get some measurements of forces on the
12 vehicle and on the dummies.

13 But what it does offer is a little bit of an
14 understanding of -- in the most controlled situation that we
15 could come up with, what really seems to happen in rollovers
16 in a general sense.

17 Now, these were dolly rollovers. That's a little
18 different kind of thing from a soil trip rollover, not
19 terribly if you consider that the first part may not be an
20 exact match, but when I say a dolly rollover one of the
21 things the industry did many years ago was to try to set a
22 vehicle up on a rolling platform that could be pulled up to
23 speed and then the platform is suddenly stopped and the
24 vehicle is, in effect, tossed out on the pavement.

25 In this case, we're talking usually about 30 or 35

1 miles per hour, and then the vehicle, when it's tossed out on
2 the pavement, it's already got a preset angle, it's already
3 set up at 25 degrees or something, 24 or 25 degrees of tilt
4 so that when it gets tossed out on the pavement it tumbles
5 pretty well.

6 It's a guaranteed rollover is what it is. But that
7 allows you in an environment where you can take high speed
8 motion pictures and study the kinematics and the motion, it
9 allows you to do that in the most controlled environment that
10 we've been able to zero in on. Even at that, there are some
11 pretty substantial variations just from one rollover to the
12 next, but that research was what's been published, and it's
13 the most current --

14 Q. What -- you said you had some roll in this or --

15 A. Well, the people that -- the principles in the work that
16 was done were in my department and we -- or we talked about
17 it, consulted, I guess you call it, during the time of
18 preparing that. And I was there when some of -- many of the
19 decisions were made of what would be done.

20 But, in addition, I later participated with those
21 authors in writing that paper on the reconstruction of
22 rollover collisions so we all were working together through
23 that time.

24 Q. Now, the speeds involved here you've said would be in
25 the 32 mile per hour range which would be lower than the

1 speeds involved at least initially with accident?

2 A. Right. Yes. The speed -- the speed in that particular
3 series was right at 32 miles per hour. It was done as fast
4 as reasonably they could pull it with that -- they had a
5 fairly large vehicle and they wanted to be sure they could
6 repeat it so that was a speed that was selected.

7 Q. Are the general engineering principles that are
8 demonstrated by this roll applicable to [REDACTED]
9 accident?

10 A. I think there's some -- yes, I think there's some very
11 useful elements of that -- that work that demonstrate some of
12 the things about the vehicle motions, the vehicle kinematics
13 or activities during a rollover, and how the dummies move
14 within the vehicle.

15 Q. I know that there were a number of tests run. How many
16 tests were run, sir?

17 A. In that -- my recollection is eight. I think that there
18 were eight tests done.

19 Q. And do you have a videotape here of a sample of those
20 tests?

21 A. Yes.

22 Q. All right.

23 [REDACTED]: Judge, we'd like to show the jury at
24 least a portion of -- as demonstrative evidence of
25 Defendants' Exhibit [REDACTED]

1 [REDACTED] Judge, I'd have to object to that for
2 this reason on the basis --

3 THE COURT: Ladies and gentlemen of the jury, let
4 me ask you to retire to the jury room, if you will.

5 (Whereupon, the jury was excused from the courtroom, and
6 the following proceedings were held in their absence.)

7 THE COURT: How long is it?

8 [REDACTED] Judge, I think we want to show in
9 the range of five minutes or so.

10 THE WITNESS: Five to six minutes.

11 THE COURT: Put it on, let's play it right quick.

12 [REDACTED]: All right, sir. [REDACTED] do you want
13 to come work this VCR? The last time I did this in a
14 courtroom I ended up erasing a tape, so if you don't mind
15 doing it, I'd -- the VCR is on this side.

16 [REDACTED]: This side -- here. It's over here,
17 [REDACTED].

18 (Whereupon, Defendants' Exhibit No. [REDACTED], a
19 videotape, was played for the Court.)

20 THE COURT: What's your problem?

21 [REDACTED] Judge, the -- Your Honor, the objection
22 to the -- we're talking about a two-point Nissan 1989 system
23 and they're talking now about a film of a Chevrolet Malibu
24 with unbelted dummies back in 1983.

25 I don't know if there can be some sort of an

1 estoppel argument during discovery, but you will recall that
2 we asked for all test results of current Nissan vehicles and
3 were told that the tests were inapplicable, not relevant
4 except for Maximas and Sentras. And on that basis you
5 limited our discovery of their current test results.

6 We had no rollover testing from them. We had no
7 developmental testing from them. And they are now purporting
8 to come in and say that the standards are applicable to some
9 other company's tests of a different vehicle with unbelted
10 dummies. And I think the prejudicial effect of that greatly
11 outweighs any probative value that it might have, Judge.

12 THE COURT: I don't understand. What's the
13 prejudice?

14 [REDACTED] The fact, Judge, that this company
15 either did not do rollover tests or presumably someone hadn't
16 provided them, but yet gets the benefit of having an expert
17 witness testify concerning -- concerning that, as if it were
18 applicable to this case and this seatbelt system, and it's
19 not.

20 THE COURT: As I'm -- I'm --

21 [REDACTED] Judge, if I could add one more point,
22 I'm sorry. It did occur to me, we have some documents that
23 they had produced, Defendants' Exhibits [REDACTED] and [REDACTED] that are
24 associated, I believe, with these tests.

25 [REDACTED] They are.

1 ██████████ And they reveal that these rollover
2 crash tests were designed to measure the influence of the
3 roof strength of these vehicles on injury mechanics and --

4 THE COURT: On what?

5 ██████████: On injury mechanics, it says, using
6 belted dummies, this one, this is a later study. But these
7 tests were designed to associate roof strength of the cars
8 with the injuries to the dummies involved. I believe some of
9 the cars were reinforced with rollbars and some of them were
10 not. The purpose of that study and that film is to correlate
11 the roof strength with injuries to the dummies and it's
12 uncontested in this case that the intrusion of the roof was
13 very minor and was not involved in the injury here.

14 ██████████: Judge, if I may --

15 THE COURT: Well, maybe I haven't heard the
16 witness's conclusions, but I don't understand how that hurts
17 you. I want you to tell me how that -- in what way you're
18 prejudiced?

19 ██████████: Judge, I think that -- I submit to you
20 that the purpose of this and what it demonstrates is
21 kinematics of the dummies, which are horrifying looking in
22 unbelted situations, and it's going to be at least suggested
23 to the jury that ██████████ would have been seriously injured
24 or killed by a rollover situation. I think that's ultimately
25 where this is going to go.

1 I suspect Dr. [REDACTED] will be testifying from the
2 same things, but I -- that's just where I see this -- this
3 testimony going.

4 At the very least, it's going to suggest to them
5 the nature of the injuries she would have had. And, of
6 course, we've had to prove that she would have not had a
7 life-threatening injury, and we have done so through the
8 testimony. And I don't believe this gentleman, of course,
9 will be able to testify about that.

10 But that's a visual, a strong visual suggestion of
11 that very -- of that very fact or allegation without any
12 support in the underlying literature that the idea of a
13 Chevrolet Malibu tested with different roof strengths would
14 be comparable to this Nissan Sentra where the roof wasn't
15 compromised. That's how I feel like it hurts me, Judge.

16 THE COURT: What do you -- the video is essentially
17 in two parts. It shows an automobile rolling, and then it
18 shows the dummies inside.

19 [REDACTED] Yes, sir.

20 THE COURT: Do you object to both or just one part?

21 [REDACTED] In fact, I think I would have -- if I
22 may speak with -- I would have no objection, Judge, to the
23 outside views of the car rolling over, if the dummy
24 kinematics weren't involved. I think that's the part that's
25 unduly suggestive.

1 ██████████ Judge, I'd like to ask if maybe I
2 can make an offer with ██████████, but we're showing -- want
3 this to show the general severity of an accident -- of an
4 accident of this speed and the general kinematics. We're not
5 trying to show this to show how something -- somebody would
6 get hurt or -- but rather to show, as he's going to testify
7 about next, occupant kinematics generally in a rollover type
8 collision and the severity of those collisions.

9 There will be no mention of injury or somebody
10 getting hurt or anything of that sort. It's just the general
11 engineering principles that we want to show.

12 ██████████ Judge, I would only add that those are
13 unbelted dummies and the articles that we used at least
14 involved two-point restraint systems. That's the whole idea.

15 THE COURT: That's the problem, it seems to me,
16 that they're unbelted.

17 ██████████ Yes, sir. And again, we just want
18 to show the general kinematics. What ██████████ will
19 testify about is the movement during the initial roll and
20 that it's the -- it's the severity of the contact with the
21 ground that causes the significant movement of the dummies,
22 and nothing more than that.

23 THE COURT: I sustain the objection as to the dummy
24 part. You can show the roll of the first part of the roll of
25 the automobile if you want to and stop there.

1 ██████████ All right, sir.

2 THE COURT: Bring in the jury.

3 (Whereupon, the jury was brought into the courtroom, and
4 the following proceedings were held in their presence.)

5 ██████████ Why don't you make sure you've got
6 it at the right place? This looks like a magician's box or
7 something.

8 THE COURT: Okay. Go ahead and show it, if you
9 want to show it.

10 BY ██████████

11 Q. ██████████, before you start that, we're going to show
12 the jury just the external view of the vehicle rolling over.
13 At what speed again was this vehicle?

14 A. At the time of the trip when the dolly is pulled out
15 from under it's 32 miles an hour, 32 and a half, I believe.

16 Q. And what does the film show in terms of general rollover
17 principles?

18 A. Well, it will show that the -- the launch off the dolly,
19 and then it will show ground contact initiating and then
20 continuing the rolling. If you picture it first, what's
21 happening is the vehicle is just being thrown translationally
22 or without any rotation off the dolly. The ground contact is
23 what trips, begins the rollover.

24 But what you'll watch is not only the rollover,
25 it's about three and a half rolls this time, but it's also

1 going to be some tumbling. Recall we've got some end-to-end
2 concerns. This will just show generally how a vehicle can
3 roll and does roll in a fairly violent kind of a roll.

4 Q. And how would the severity of this roll compare to your --
5 a roll at your estimated trip speed of 46 to 56 miles per
6 hour?

7 A. At 46 to 56, there's more energy to be managed, and
8 that's what happens in the rollover. Of course, in the
9 incident that we're dealing with here today, it takes place
10 over a longer distance, and, thus, longer time, so it's more
11 severe in terms of probably the number and the individual
12 magnitudes.

13 Q. All right. Please proceed.

14 (Whereupon, Defendants' Exhibit No. [REDACTED] was played
15 for the Court and jury.)

16 THE WITNESS: Let me just back that up just a
17 second. I don't have it wound up just right. There. What
18 you're going to see is first, real time, this is the way it
19 comes sliding down the -- and now the dolly is stopped and
20 the vehicle is just tossed out and the wheels contact and it
21 rolls and rolls and comes into a -- I guess that's a quarter
22 of a roll position.

23 THE COURT: I don't recall that being what I said
24 you could show.

25 [REDACTED] I thought that -- I'm sorry, Judge?

1 THE COURT: I said you could show the first part.
2 That's not the first part, as I recall.

3 [REDACTED]: He said the first test. Go back and
4 show the very first test. From the very beginning. Make
5 sure we get it at the right place.

6 (Whereupon, Defendants' Exhibit No. [REDACTED] was played
7 for the Court and jury.)

8 BY [REDACTED]

9 Q. All right. Now, back up if you want to, to the start.
10 To the start, I'm sorry.

11 A. Can everyone see that?

12 Q. And I interrupted you. I think you said that you were --
13 this is in real time?

14 A. This is in real time. You can see also how the vehicle --
15 in this particular thing the vehicle tumbled some during the
16 roll. This is a higher speed, it slows down the action.

17 Q. Higher speed film you mean?

18 A. Higher speed film. It runs the film through the camera
19 faster, then when you play it back, it slows down the action.
20 This is one of the ways you study what happens in a rollover.

21 Now, you've got a long lens on the camera, a
22 telephoto lens, and it will all roll toward you. One of the
23 other things that you can see here is that sometimes during
24 the roll, the vehicle doesn't all contact. It sometimes is
25 flipping and missing the ground.

(Tape concluded.)

1
2 BY [REDACTED]:

3 Q. [REDACTED], as a part of your reconstruction, did you
4 also look at the question of movement within the
5 vehicle?

6 A. Yes.

7 Q. And --

8 A. The kinematics is what I called it.

9 Q. And do you have some opinions in that regard?

10 A. Yes.

11 Q. All right. And could you explain those, please, to the
12 jury?

13 A. There are two -- three key elements of kinematics that
14 come from looking at the -- this particular vehicle and
15 rollovers in general.

16 One of them is that during the trip phase, there's
17 a large acceleration applied to the vehicle and the driver or
18 the occupants will respond to that. There's a secondary
19 phase when rollover is commencing, just the activity of
20 rolling over and causing a rotation will tend to cause
21 motion, the specific kind of motion of all of the occupants
22 of the vehicle.

23 There will be a tendency to move out from the
24 center of rotation. And the third one has to do with how the
25 occupant responds to significant ground impacts of a large or

1 significant nature; in other words, responding to an external
2 impact against the ground. So there are three areas of
3 kinematics that are relevant there.

4 Q. All right. And would you now review for the jury,
5 please, your -- what you believe or your opinions with regard
6 to the kinematics of [REDACTED] in this accident?

7 [REDACTED] Judge, I'm just going to interpose a
8 short objection on that because this gentleman was deposed by
9 [REDACTED] and he indicated he would have no opinion except as
10 to accident reconstruction and none other.

11 [REDACTED] I don't believe that's the case,
12 Your Honor. I think kinematics would be a part of his
13 reconstruction.

14 THE COURT: Well, show me.

15 [REDACTED] Should I approach the bench, Judge?

16 THE COURT: Please. Just tell opposing counsel
17 what page and let me see it.

18 [REDACTED]: Beginning at page [REDACTED] of his
19 deposition, Judge.

20 [REDACTED] Judge, we're not -- maybe there's
21 some misunderstanding.

22 THE COURT: Sir?

23 [REDACTED]: I don't intend to ask any questions
24 about how she got hurt in the accident but rather her
25 movement within the vehicle. Maybe that's --

1 (Whereupon, a discussion was had between the Court and
2 counsel at the bench out of the hearing of the jury as
3 follows:)

4 [REDACTED] Judge, it's not the mechanism of death,
5 the mechanism of injury, are you going to do any kind of
6 injury analysis. Do we have to say the magic word kinematics
7 that's involved in how how she got hurt, he purported to be
8 accident reconstruction only in terms of how this vehicle
9 moved, what happened in the accident.

10 [REDACTED] didn't use the magic word body kinematics.
11 He certainly asked enough questions and he should have been
12 able to list his opinion about those areas.

13 THE COURT: I overrule the objection.

14 (Bench conference concluded.)

15 BY [REDACTED]:

16 Q. All right. [REDACTED], if you would, I believe I had
17 asked you to either tell the jury or demonstrate to the jury
18 what you believe [REDACTED]'s movement, this occupant
19 kinematics was within the vehicle during the accident?

20 A. Just for clarification, what I'm really talking about is
21 response to accelerations, and it's -- frankly, it's sort of --
22 but it's as if the person were a bag of potatoes or
23 something. It's just in response to acceleration, when I
24 speak of kinematics that's what I'm dealing with here, I
25 wouldn't -- I don't address injuries or --

1 Q. I understand that. Yes, sir?

2 A. Okay. What we're talking about, is there's a course of
3 events that's leading up to this rollover. The course of
4 events is a hard swerve on the roadway then the rutting or
5 digging in the off-road shoulder leading to the point of
6 trip.

7 What that does in the vehicle is it induces a
8 lateral acceleration and the response that the driver or the
9 passenger would have kinematically would be to feel --
10 experience an acceleration toward their -- in this case
11 toward the outside of the turn.

12 In effect what happens is the car is pulling inside
13 and they're trying to keep going straight ahead at any given
14 moment, so when you go hard around a turn you tend to go, oh,
15 lean to the outside. That's what we're talking about
16 kinematics and as the trip occurs that force becomes becomes
17 very hard. In a hard turn you might be dealing with half to
18 maybe seven-tenths of a G, and when you reach trip mode it
19 can reach two G's, and that's a lot more than we're able to
20 handle in driving.

21 And what will happen there is the kinematics or the
22 impact acceleration involved with the tripping will cause a
23 displacement or a force to be applied to the body to go to
24 the right. In this case, since we're in a bucket seat and we
25 have at least partial restraint here, we're going to tend to

1 just tip over against the center stuff, and that will be
2 happening all during the -- both the turn and then the trip.

3 The trip, of course, is going to have the high
4 acceleration force.

5 Q. Let me -- in conclusion, [REDACTED], what is your
6 opinion as to how fast [REDACTED] was going at the first time
7 you were able to judge her speed on the highway?

8 A. I have that at, in a range of 61 to 75 miles per hour.

9 Q. And, in your opinion, how many times did her automobile
10 roll over during the course of this accident?

11 A. There was three and a half rolls.

12 [REDACTED] He's yours.

13 CROSS-EXAMINATION

14 BY [REDACTED]:

15 Q. [REDACTED], I want to briefly touch upon your history
16 at GM without going through all the particulars of that.
17 Essentially, from [REDACTED] to [REDACTED] you attended -- is it a
18 college?

19 A. Yes.

20 Q. That is -- is it affiliated with General Motors?

21 A. It was then. It isn't now.

22 Q. Okay. At the time -- in essence you were working with
23 and for GM --

24 A. Yes.

25 Q. -- even while in college; is that correct?

1 A. Yes.

2 Q. And then finally through the years you had various and
3 sundry promotions with them and we'll talk about some of your
4 activities very quickly, but essentially to skip ahead and
5 get a perspective on that, you retired from General Motors
6 after 31 years.

7 A. Correct.

8 Q. Does that include the four years in college?

9 A. Yes, sir, it does.

10 Q. Okay. So 31 years unbroken as a -- affiliated with the
11 General Motors Corporation; is that correct, sir?

12 A. Correct, yes.

13 Q. Okay. Now, getting out of -- once you got out of their
14 college, realizing that at some point you began doing
15 reconstruction work, I think I had that as [REDACTED] or so?

16 A. ' [REDACTED]

17 Q. ' [REDACTED] to ' [REDACTED] that period of time?

18 A. Yes, in [REDACTED] it began.

19 Q. Okay. Now, there was a time period there, and I believe
20 it's the same period of time, and if I'm not mistaken, where
21 you were not actually doing crash testing; that is, you
22 weren't the person setting the cars up, but you were
23 analyzing crash tests; is that right?

24 A. That's right.

25 Q. And in that period of time viewing actual wrecks for

1 General Motors, as well, you would go out to a wreck scene
2 involving a General Motors vehicle and make some kind of
3 assessment as to the performance of the vehicle; is that
4 correct?

5 A. Right.

6 Q. Okay. Now, also in [REDACTED] you started testifying, did you
7 not, on behalf of General Motors?

8 A. That was the first time I did a deposition, yes.

9 Q. Okay. And now at this time you're an employee of
10 General Motors and you're beginning to work with their legal
11 staff; is that correct?

12 A. At that time, yes.

13 Q. Okay. And am I correct that as well as beginning
14 reconstruction work at this time, you also from this point
15 forward get more heavily involved in testifying and working
16 with the legal department on behalf of GM products; correct?

17 A. Yes, it --

18 Q. And also -- I'm sorry. I didn't mean to interrupt you.

19 A. Yes.

20 Q. Okay. And also much more involved in designing even
21 crash tests; is that correct?

22 A. Yes.

23 Q. Okay. Now, while you were at GM, and I'm looking at,
24 particularly, the period of [REDACTED] through [REDACTED] --

25 A. All right.

1 Q. -- if you recall that, I think you had indicated you had
2 more increasing activity as a witness and interaction with
3 the GM legal department and also were designing crash tests
4 at that point; is that right?

5 A. I think that's probably true, yes.

6 Q. And analyzing results for General Motors; correct?

7 A. Yes.

8 Q. And none of that testing was done for NHTSA, was it,
9 sir?

10 A. No.

11 Q. Okay. Now, real briefly, NHTSA testing would have been
12 testing to demonstrate compliance with Federal Motor Vehicle
13 Safety Standards; correct?

14 A. With something like that, yes.

15 Q. Okay.

16 A. There are a couple of ways that the NHTSA conduct or
17 authorize contracts testing but that's one of them,
18 compliance.

19 Q. All right, sir. But the testing, I believe we discussed
20 in your deposition, the testing you were doing at that time
21 was not testing for NHTSA; instead it was GM doing its own
22 crash testing?

23 A. Yes.

24 Q. And that's for its own research and development; is that
25 right?

1 A. Basically, yes.

2 Q. In other words, not designed to meet any particular test
3 the government is holding over them but to do something to
4 come up with a better restraint system or a better -- or a
5 better product.

6 A. The work I did had nothing to do with the work that was
7 done in response to the federal requirements.

8 Q. All right, sir.

9 A. Other people were doing that.

10 Q. In other words, it was in-house work that GM was doing
11 on its own?

12 A. Yes.

13 Q. Okay. And you were involved in doing rollover tests for
14 General Motors; is that correct, sir?

15 A. Until [REDACTED], I wasn't.

16 Q. Okay. After [REDACTED], were you?

17 A. I was peripherally involved with the work that we spoke
18 about in that research paper.

19 Q. And the research paper is what is reflected on the
20 video, at least the earlier work that the jury saw; is that
21 correct?

22 A. Right.

23 Q. And that video is copyrighted GM product demonstrating
24 rollover tests that General Motors was doing on the Malibu in
25 those years in the early '80s; correct, sir?

1 A. Yes, [REDACTED].

2 Q. Okay. That wasn't designed to satisfy a government
3 requirement that was designed to come up with a better
4 product; correct?

5 A. Well, it was designed to do some research in that area
6 and hopefully that would give you a better understanding for
7 the better product, yes.

8 Q. All right, sir.

9 A. So it leads hopefully to that goal.

10 Q. All right. And would you agree that any prudent
11 manufacturer will do those kind of tests on its products in --
12 both in development when it comes up with a new product, to
13 see if, for example, a restraint system performs well in a
14 rollover situation?

15 A. This kind of testing is research, and it wasn't designed
16 to evaluate that vehicle. That vehicle was out of production
17 at the time those tests were run. It was purely research.
18 But -- and as -- well, you may not know, but that was not
19 restrained, the occupants were not restrained.

20 Q. That's right, in that particular rollover test the
21 occupants were not restrained?

22 A. That's right.

23 Q. But haven't you been involved in rollover testing with
24 restrained dummies?

25 A. I've seen some of that. I haven't done it.

- 1 Q. Your aware that it takes place, are you not?
- 2 A. It can, yes.
- 3 Q. And you believe it's a prudent activity for a
- 4 manufacturer to take place, even if it's just research and
- 5 development if it's -- if it's ultimately going to lead to a
- 6 safer product?
- 7 A. Or a better understanding, yes.
- 8 Q. All right, sir.
- 9 A. A better understanding is what this objective was.
- 10 Q. Now, you've been retained, and we'll go into that a
- 11 little bit more, but essentially you're serving as an expert
- 12 witness for a fee in this case and have been retained by Mr.
- 13 [REDACTED] to testify for Nissan; correct, sir?
- 14 A. Well, to testify in this case, yes.
- 15 Q. Yes, sir, on behalf of Nissan company.
- 16 A. Yes.
- 17 Q. And were you provided with any rollover testing that
- 18 Nissan did regarding this 1989 Nissan Sentra?
- 19 A. No.
- 20 Q. Did you ask for it?
- 21 A. I did, I asked if there was any.
- 22 Q. And you were told there was none; correct, sir?
- 23 A. That's my understanding, yes.
- 24 Q. All right. Did you ask for developmental testing about
- 25 these vehicles?

1 A. I knew that some frontal impact work has been done, but
2 I haven't -- that wasn't directed to the rollovers.

3 Q. Yes, sir. My question was, did you ask for
4 developmental testing?

5 A. Well, the frontal stuff would be what I would consider
6 developmental.

7 Q. Okay.

8 A. I knew that it existed, but I didn't -- it wouldn't
9 relate to what I was going to try to do so I didn't --

10 Q. All right, sir. Well, we've been informed that
11 developmental testing has not been retained pursuant to
12 Nissan's document retention policy, and I want to ask you,
13 sir, what knowledge you have regarding developmental testing
14 that Nissan did on the 1989 Nissan Sentra?

15 A. I guess I don't have any. I didn't know that or I don't
16 know that yet.

17 Q. Now, you mentioned, I think, something that [REDACTED]
18 had offered you, and that is the same that he offered to us,
19 I presume, frontal crash tests; correct?

20 A. That's what I understood, yes.

21 Q. And -- and after he retained you as an expert and said,
22 do you want to look at these tests, you essentially told him,
23 I don't have to look at them because it's useless as far as
24 looking into this rollover situation; correct?

25 A. As far as the work I was doing it wouldn't have

1 benefited.

2 Q. And that's because [REDACTED] died in a rollover
3 situation, and all those tests are frontal impact tests;
4 correct?

5 A. That's what the testing that I understood existed was,
6 frontal.

7 Q. And the engineering principles involved and the results
8 you could see from that kind of crash testing wouldn't have
9 aided you at all in terms of your analysis of this rollover
10 situation?

11 A. That's right.

12 Q. And, likewise, they don't aid Nissan, do they, the tests
13 that were done there in evaluating this Nissan Sentra and the
14 restraint system in it for a rollover situation?

15 A. I really don't know if it would help or not. It didn't
16 help me do the reconstruction work. Whether it would help
17 them in reevaluating the restraint performance, I couldn't
18 answer.

19 Q. Well, would you agree with the general proposition that
20 a rollover situation is materially different from a head-on
21 situation, in terms of the things that a company can learn
22 about various and sundry aspects of its car, including
23 restraint systems?

24 A. They are distinctly different, and -- yes. But the
25 problem with a rollover is that it's really difficult to get

1 consistent results. Most of the kinds of data you are
2 alluding toward at least are not done in a rollover test.
3 They're done in more of a static kind of a test, a site
4 impact kind of a thing or static laboratory kind of work.

5 Q. Yes, sir. And that's because the tests that the
6 government requires are either straightforward or at a
7 30-degree angle; isn't that correct, sir?

8 A. Well, that's part of the reason.

9 Q. Right, sir.

10 A. That's part of the reason. The other is that the
11 rollover is extremely difficult to get repeatable results.
12 Generally, though, most of the work that's done across the
13 industry, as far as I know, is done in a more static mode
14 because you can understand what your results are.

15 Q. Well, sir, then why were these tests done at General
16 Motors?

17 A. They were done to evaluate roof strength issues.

18 Q. And they were done in a rollover situation?

19 A. Yeah, but it was a roof strength question that they were
20 looking at there.

21 Q. All right, sir. And is your testimony to the jury that
22 in assessing the relative effectiveness of lap belt systems,
23 two-point shoulder restraint systems versus integrated
24 systems, the rollover tests wouldn't be worth doing by a
25 prudent manufacturer?

1 A. They would be very non-informative, I'm afraid, because
2 of the variability from one to the next. It is a very
3 difficult situation with rollovers and the work that was done
4 in the thing that you saw, part of the tape that you saw
5 anyway, was about the best that anybody has been able to do,
6 and still the variability was great across it. I wouldn't
7 think that anybody would be able to assess performance of a
8 restraint system from that work.

9 Q. Nobody would be able to assess performance of a
10 restraint system from rollover work?

11 A. From that kind of work, even as good as that -- good
12 quality as that was, it's not good enough.

13 Q. And hence, it's simply not done; is that correct?

14 A. As far as I know, it is not.

15 Q. Are you saying, sir, that you are unaware of any major
16 car manufacturer doing rollover tests to test its restraint
17 system?

18 A. I have not seen or heard of anything that's been done
19 like that.

20 Q. You have not seen a rollover test done to test the
21 restraint system by a major automotive manufacturer?

22 A. Not in a rollover situation, at least as far as I've
23 ever known.

24 Q. All right, sir. [REDACTED], let me back up a moment.
25 After 31 years at General Motors, you retire, as you

1 indicated, and took a job with [REDACTED] Research
2 Corporation; is that correct?

3 A. Yes, sir.

4 Q. And essentially has [REDACTED] contacted [REDACTED]
5 Research Corporation to retain your services?

6 A. His office contacted me directly.

7 Q. You there are the head of accident reconstruction
8 division; is that correct?

9 A. That's right.

10 Q. And before you came there, am I correct in my
11 understanding that there was no accident reconstruction
12 division?

13 A. That's right. Some of the people did that kind of work,
14 but it wasn't a division and it wasn't really the consulting
15 level of operation that it is now.

16 Q. Who was the head of [REDACTED] Research Corporation at
17 the time you went there?

18 A. Dr. [REDACTED]

19 Q. Dr. [REDACTED]. And this is someone you had known
20 for several years when you retired from General Motors?

21 A. Yes, I had worked with him, three, four, five years
22 perhaps while I was with GM.

23 Q. And you are working with him in this case as well, are
24 you not?

25 A. As a matter of fact, yes.

1 Q. Now, Dr. [REDACTED] -- pardon me, let me back up.

2 [REDACTED] you're the head of the accident reconstruction
3 division of [REDACTED] Research Corporation. What is Dr.
4 [REDACTED] the head of, what division?

5 A. He's the president. He's also the head of the
6 consulting division.

7 Q. Consulting. You also have injury causation, research
8 and contracting, reporting, and administrative; is that
9 correct?

10 A. Well, basically his consulting is the injury causation
11 division.

12 Q. All right.

13 A. But those other divisions exist, yes.

14 Q. Yes, they do. And your company employees about 60 to 70
15 full-time people; is that correct?

16 A. I think so.

17 Q. All right, sir. Now, [REDACTED] over the years, I
18 alluded to your testimony on behalf of General Motors, am I
19 correct, sir, that first of all, trying to find my figures,
20 you indicated to me how many times you had testified in trial
21 regarding accident reconstruction on behalf of General Motors
22 while an employee there, and was the number 56? That's what
23 I seem to recall but I can't find it.

24 A. I think 56 was the number I could recall, but I -- as a
25 matter of fact, I think I estimated it was probably higher

1 than that, but I couldn't get all the cases brought together.

2 Q. All right, sir.

3 A. 56 is what I could prove, I guess.

4 Q. So over 31 years you had testified as an expert witness
5 for General Motors, your employer, 56 times; correct?

6 A. At least.

7 Q. Now, since you left General Motors to go to [REDACTED]
8 Research Corporation, I think you indicated maybe this is the
9 fifth time or maybe there has been more, but you have since
10 then testified exclusively on behalf of automobile
11 manufacturers; is that correct?

12 A. Yes.

13 Q. All right, sir. So in your career of over 31 years, you
14 have never testified on behalf of anybody in court except an
15 automobile manufacturer; is that correct?

16 A. That's correct.

17 Q. And I presume that in each of those instances you have
18 testified in favor of the manufacturer as opposed to against
19 it?

20 A. Reconstruction evidence isn't always favorable or
21 unfavorable. It's just what happened and --

22 Q. Well, sir, did General Motors ever bring you to court to
23 render an unfavorable opinion against them?

24 A. I don't know. I don't know. I don't think so.

25 Q. Did you ever take a witness stand and render an opinion

1 that hurt General Motors?

2 A. I don't know. I don't think so.

3 Q. Sir, in your years at General Motors, you've indicated
4 that -- let me ask it this way to be sure: First of all, are
5 you aware of any rollover testing that General Motors ever
6 did involving a restraint system, whether the results were
7 inconsistent or not?

8 A. Yeah. The evaluation that you just saw was the
9 unrestrained version of testing that was conducted later.

10 Q. All right, sir. And later testing, similar to what the
11 jury saw, was done using restrained dummies; correct, sir?

12 A. Yes, about four years later.

13 Q. Okay.

14 A. Five years later, I'm sorry.

15 Q. And that material has been saved and copyrighted by
16 General Motors; is that correct?

17 A. It's been saved, yes.

18 Q. Okay. And it's available today to people such as you to
19 testify about it, quite obviously?

20 A. It's been made publicly available through the SAE.

21 Q. All right, sir. Now, when you were at General Motors,
22 did General Motors do developmental testing, what I -- I'm
23 going to separate that from compliance testing which I think
24 you know what I'm talking about, correct?

25 A. Okay.

1 Q. Now, developmental testing, please tell the jury what
2 that would be?

3 A. That would be testing to evaluate your product according
4 to your own standards.

5 Q. All right, sir. And did General Motors do that, such
6 testing, while you were there, sir?

7 A. Well, I'm aware of some of that testing that's done.
8 It's a wide range of kinds of testing, whether it's fuel
9 systems or engines or transmissions or bumpers or whatever,
10 yes.

11 Q. But it does take place with restraint systems as well,
12 does it not?

13 A. I'm sure it does.

14 Q. All right, sir. And what is -- is not the value of such
15 testing to record the results and maintain them and keep them
16 so they can be referred to in the future?

17 A. Well, the value of it is to make sure that the product
18 that eventually results from all the work is useful.

19 Q. All right, sir. And, hence, that kind of testing is not
20 disposed of soon after it's done, is it?

21 A. Well, some of the developmental testing isn't recorded
22 in the same format as the more formal final testing. It will
23 vary quite a lot, according to the test engineers assignment.

24 Q. All right, sir. Did General Motors during your time
25 period maintain developmental testing?

- 1 A. Some.
- 2 Q. All right, sir.
- 3 A. Wait, I'm not sure I could answer at all time periods,
4 but the time periods I'm familiar with like from the late
5 '██████ to the late ██████, yes.
- 6 Q. It did maintain developmental testing; correct?
- 7 A. Some of it.
- 8 Q. Some of it. Okay. How did they choose what to maintain
9 and what not to?
- 10 A. That would be the test engineer's decision.
- 11 Q. The test engineer who was in charge of a particular
12 project would make a decision as to whether or not he or she
13 wanted to maintain the developmental testing regarding a
14 given aspect of the car; is that correct?
- 15 A. That's my understanding. That's been my experience,
16 yes.
- 17 Q. All right, sir. Are you familiar with Nissan company's,
18 what they term their document retention policy?
- 19 A. No, I'm not.
- 20 Q. All right, sir. When you did your reconstruction,
21 ██████ one aspect of it that you did and touched on with
22 the jury was to go out and to pick up very carefully
23 different sizes of glass; correct?
- 24 A. Yes.
- 25 Q. And I don't know if the width, the different widths of

1 that glass was apparent to the naked eye, but what you were
2 doing was taking some kind of caliper, were you not, and
3 measuring the width of the glass so you could tell where on
4 the vehicle it came from?

5 A. Right. It was a microcrometer.

6 Q. All right, sir. I'm sorry. I --

7 A. That's what it is.

8 Q. In order to do that, to make that meaningful, you needed
9 to get from Nissan their specifications on this automobile
10 down to the detail of how thick the glass was in the
11 windshield and the side windows and the hatchback itself, did
12 you not?

13 A. Right, yes, sir.

14 Q. So you asked for that information?

15 A. Yes.

16 Q. And it was provided to you; correct, sir?

17 A. Yes.

18 Q. I can't remember if you said if you asked for
19 developmental testing or not?

20 A. I didn't ask for anything that specifically, I just
21 asked if there was any rollover testing.

22 Q. All right. And you were told there was none?

23 A. That's correct.

24 Q. But they had documents detailing how thick their glass
25 was all over the car?

1 A. Yes. It was the documents that were used to manufacture
2 the glass.

3 Q. All right, sir. Now, having manufactured those glass,
4 why would you retain such documents?

5 A. Because they -- for awhile, at least, they continue to
6 need to manufacture them.

7 Q. All right, sir. And for awhile at least, isn't
8 developmental testing a valuable thing to maintain?

9 A. For awhile it would be. It still depends on the people
10 that are doing the development. If you get to a point where
11 the device or the design you're developing has been discarded
12 then you probably won't keep the testing of the discarded
13 device.

14 Q. Well, sir, had the device, that is, a 1989 Nissan
15 Sentra, become obsolete in terms of re-evaluation or testing
16 by 1990?

17 A. I don't know.

18 Q. That would be up to whatever project engineer was
19 working that particular --

20 A. Yeah, they would know the history and what the future
21 held and whether they were -- you know, I just don't know
22 exactly what was going on there as far as how long that
23 vehicle was to be built.

24 Q. All right, sir. Also, sir, I believe that while at GM,
25 you not only -- we talked about you analyzing crash tests.

1 Eventually, you began designing crash tests, am I correct?

2 A. Yes.

3 Q. And continued throughout your time at General Motors to
4 testify in conjunction with the legal department there on
5 behalf of General Motors?

6 A. Yes.

7 Q. And you at least became aware, did you not, sir, that
8 General Motors had in production and has in production today
9 a three-point passive belt system?

10 [REDACTED]: Excuse me, Your Honor. This witness
11 was offered for accident reconstruction. He's only testified
12 in that area. I think this is far beyond the scope of his
13 direct examination.

14 [REDACTED]: Your Honor, given the number of fields
15 that he's been involved in with this company including
16 analyzing crash testing, formulating of the same --

17 THE COURT: Go ahead. I'll overrule the objection.

18 BY [REDACTED]:

19 Q. You are aware, are you not, [REDACTED] that General
20 Motors has in production and has had for some time
21 automobiles with three-point passive restraint systems?

22 A. I'm familiar with a couple of door-mounted type with
23 three-point systems.

24 Q. All right, sir.

25 A. But they are not as -- well, never mind. Yes, I am

1 familiar with them.

2 Q. All right, sir. Now, in terms of your company, your
3 present company, sir, does it testify exclusively for
4 automobile manufacturers?

5 A. No.

6 Q. All right, sir. It will be -- it is willing to be
7 contacted by an individual who has a claim that they think is
8 valid against a major automobile manufacturer?

9 A. The only -- the only restriction that we have had on
10 that is that we don't take a case against an existing client.

11 Q. All right, sir. And your existing clients are [REDACTED]
12 correct?

13 A. Yes.

14 Q. [REDACTED]?

15 A. Yes.

16 Q. [REDACTED]?

17 A. I believe so. I don't have any --

18 Q. [REDACTED]?

19 A. Yes.

20 Q. [REDACTED]?

21 A. Yes.

22 Q. [REDACTED]?

23 A. Yes.

24 Q. [REDACTED]?

25 A. Yes.

1 Q. As a practical matter, would you agree with me that your
2 company does precious little testifying or analysis for
3 anyone other than major car manufacturers?

4 A. No, not really. There's quite a lot of the work that
5 the doctors do that is related to something -- a circumstance
6 that doesn't involve one of the manufacturers.

7 Q. How -- well, okay, then, how about yourself, in accident
8 reconstruction, are you not always testifying on behalf of an
9 automobile manufacturer?

10 A. I am not always. Probably at this point, since this has
11 only been not quite two years, I've only got three or four
12 that are of that nature.

13 Q. And so long as there is not a conflict with an existing
14 client then, that company can testify on behalf of a
15 plaintiff as well as a defendant?

16 A. There are other factors that go into it, like whatever
17 there is time to do, what the client needs, but that's not --
18 other than that, there's no other restriction.

19 Q. And you have not had the opportunity to do it yet; is
20 that correct? Have you testified on behalf of a plaintiff
21 yet?

22 A. Not in a trial.

23 Q. All right, sir. I believe you have testified at the
24 request of [REDACTED] before on -- on at least three or
25 more trials?

1 A. I think that's right.

2 Q. All right, sir. And another six or eight occasions that
3 did not go to trial in which you gave depositions
4 reconstructing accidents at the request of [REDACTED]

5 A. Probably, yes.

6 Q. All right, sir. [REDACTED] has been the attorney in
7 at least one of those occasions?

8 A. One or two.

9 Q. All right, sir. And in this case, am I correct, sir,
10 that you were asked by [REDACTED] only to do an accident
11 reconstruction, not to give your opinion regarding things
12 like cause of injury; correct?

13 A. Yes. The injury cause is something I usually -- I
14 always decline.

15 Q. All right, sir. And you were specifically asked not to
16 give an opinion regarding a defect alleged in this seatbelt
17 system; isn't that correct, sir?

18 A. I was not specifically asked to evaluate the seatbelt
19 system.

20 Q. All right, sir.

21 A. It's a little different from the way that question came
22 out. I wasn't asked to do that.

23 Q. You were not asked to do that. At the time of your
24 deposition, you had no opinion one way or the other on
25 whether the seatbelt system was defective, did you, sir?

1 A. That's correct.

2 Q. Regarding your activities in investigating this
3 particular rollover, sir, you have indicated to us that you
4 made an initial visit, I believe, to the accident scene the
5 same day that you first saw the vehicle; is that correct?

6 A. That's correct.

7 Q. And I think you said that there was fairly little damage
8 or intrusion on the inside of the vehicle; is that correct?
9 Fairly little damage to the interior of the vehicle?

10 A. Oh, there -- yes, it was very specific where the damage
11 was. It was, like I said, the door, the seat, and the sun
12 roof opening.

13 Q. But no great intrusion, no crashing down or anything
14 coming into the compartment that would have tended to harm
15 someone?

16 A. Well, you wouldn't want to say that the roof deformation
17 would cause harm, that's not the way it would work. But the
18 roof did not seem to be significantly crushed.

19 Q. Can we say that the occupant compartment was largely
20 intact?

21 A. Largely. All the glass is out, but the rest of the
22 compartment was largely intact.

23 Q. All right, sir. And in terms of making your report and
24 the measurements that you showed the ladies and gentlemen of
25 the jury, you used [REDACTED] measurements of these marks

1 in the road because he's the only one that made any
2 measurements; correct, sir?

3 A. Of -- initially, yes, of the marks that he saw on the
4 pavement.

5 Q. All right, sir.

6 A. And then I was able to -- excuse me -- able to verify by
7 the photograph that he offered where the reflector -- based
8 on where the reflector was that that was a fair evaluation.

9 Q. You chose not to use [REDACTED] measurements in terms
10 of the point, from the point of rest up until the time where --
11 the point where the vehicle left the road; is that correct,
12 sir?

13 A. Well, I had work that I did at the scene that helped to
14 do that.

15 Q. All right, sir. Is that when you paced it off at the
16 scene?

17 A. No, that was -- that was based on the work that the
18 surveyor did. I paced some stuff the first trip, but that
19 was just the location of the door handle and that glass trim
20 piece that I found that first day. But the rest of it was
21 based on the survey, which would be accurate.

22 Q. And did I understand -- and correct me if I'm wrong, was
23 the survey some 30 to 40 feet different from what Trooper
24 [REDACTED] had measured in the accident report?

25 A. No, no, the survey works out to be just about exactly

1 right.

2 Q. You explained something to the jury something about a
3 30-foot differential, and I just wanted to be sure I
4 understood.

5 A. What I was talking about is when I make my calculations
6 I'm thinking about where the mass center goes, or the CG
7 goes, and if you were at the scene making measurements you
8 would look for where the tire mark first left the pavement
9 and where the car came to rest and that's pretty good.

10 I just didn't want to have anybody confused that my
11 measurements were supposed to match exactly with his because
12 I don't -- you know, except that you can go to the map and do
13 that check and it comes out very close to the 281 feet.

14 Q. Am I correct that following your initial visit to the
15 scene and your initial inspection of the vehicle, you
16 consulted with Dr. [REDACTED] at that time?

17 A. I think we had a -- yes, I had an initial conversation
18 with him after the vehicle inspection.

19 Q. And you indicated to him that preliminarily you thought
20 it would be somewhere between two and five rolls?

21 A. I -- frankly, at this point I don't remember, except
22 that I told him it was multiple rolls and there's always a
23 half, and I'm not sure what I told him except multiple rolls
24 and I'll have to work out how many.

25 Q. And you also told him, did you not, on the phone that

1 there's an indentation in the sun roof's border that I want
2 you to look at?

3 A. I just wanted to make sure that he did because I had put
4 the gasket back over it. Apparently, that was missed and
5 seen at different times because people didn't always remove
6 the gasket.

7 Q. Now, on your first visit to the scene, am I correct that
8 I'm sorry, let me go back to the gasket or the molding. What
9 is your preference, gasket?

10 A. It is a gasket.

11 Q. The gasket that goes around the sun roof, sir, it does
12 go over a flange, does it not?

13 A. Yes.

14 Q. And I think you described that flange awhile ago as
15 straight?

16 A. Well, it's got straight edges and rounded corners and
17 then it's folded up.

18 Q. It's cupped, is it not?

19 A. Yes. Yes.

20 Q. So that someone coming in contact with whatever part of
21 their body from the side of that sun roof border does not
22 come in contact with a straight piece of metal, do they?

23 [REDACTED] Judge, he's objected to my asking
24 this witness about injury causation and now he's asking him
25 about it. It seems like to me that's inconsistent.

1 ██████: I think I'm asking him about the
2 physical aspects of what is found there. May I rephrase?

3 THE COURT: Go ahead.

4 BY ██████:

5 Q. Anything that comes in contact with that sun roof border
6 does not come in contact with a straight piece of metal but
7 with a cupped piece of metal; correct?

8 A. It is folded up, and it's about, oh, between a quarter
9 and three-eighths high of an inch, so it is a turned-up edge.
10 That's how the gasket fits down over it.

11 Q. Right. And so any object coming in contact with that
12 does not meet a straight edge, they meet a thickness of some
13 degree, do they not?

14 A. Yes. But, all right, the concern I had when you talked
15 about that is my finger has more thickness than that molding
16 does -- or that turned up flange, so it's not like a straight
17 piece of paper or cardboard, that's correct. It is a narrow
18 piece, but it's --

19 Q. Curved up?

20 A. Not too -- shaped like my fingers.

21 Q. All right. Now, on the first visit to the scene you
22 decided that the grass was knee high and you really weren't
23 going to be able to do your sampling, were you, taking the
24 samples of the debris?

25 A. That's right. And I also knew that I was going to be

1 needing to get over to look at the vehicle fairly soon so --

2 Q. All right, sir. So you had to come back some months
3 later. And how many months later was that, sir?

4 A. That turned out to mid to
5 the first of

6 Q. And --

7 A. Almost three months.

8 Q. All right, sir. When you came back, you noticed, first
9 of all, that the area had been mowed, had it not?

10 A. Yes.

11 Q. And had you ever been informed that [REDACTED] had
12 cleaned up the area, as the wrecker driver, following the
13 incident, collected what debris he could find?

14 A. I didn't know that but -- I don't remember anybody
15 telling me that, but I would assume that the wrecker operator
16 usually picks up the big pieces.

17 Q. All right, sir. Furthermore, your people had to sling
18 blade it; is that right, slightly?

19 A. I'm sorry?

20 Q. I believe that I thought I understood that the people
21 that you were with or brought down with you had to sling
22 blade the area somewhat to be able to --

23 A. I didn't understand that term. We used a grass whip.

24 Q. I'm sorry, a weed eater?

25 A. Yeah, one of those. Just enough to knock off some of

1 the tallest stuff.

2 Q. And in some areas the water was running through some of
3 that area?

4 A. As the day got longer the rain got heavier and the ditch
5 started to carry a certain amount of water.

6 Q. In terms of your analysis, sir, is it your assumption
7 that such debris as you were looking at, plastic articles,
8 glass, et cetera, is going to be in place precisely where the
9 vehicle rolled and let it go?

10 A. If it's not in the actual water path in the bottom of
11 the ditch, yes.

12 Q. Is debris not?

13 A. It stays -- the glass, at least, stays very well.

14 Q. Debris is not thrown ahead of a wreck and behind a
15 wreck?

16 A. Some is. Some is. It depends on how the glass pattern
17 goes. If you'll recall when the first impact occurs, at
18 least it looked like there was a very heavy concentration of
19 side glass, which is like when the impact is with the glass
20 close to the front and it just, in effect, all drops there.

21 But as the car went along it carried some of those
22 particles along with it. So you get initial contact and
23 initial location of glass, and then the spray follows along
24 with it. So all you really can be sure about is where the
25 first evidence of that glass is.

1 That's why about all I can tell you is where the
2 first side glass is, where the first sun roof is, where the
3 first hatch and so on, because those pieces carried along
4 until the -- somewhere after the second roll position.

5 Q. Didn't you, in fact, sir, go down and plant flags that
6 were numbered from ■■■, ■■■, or ■■■ through ■■■?

7 A. It was in the ■■■'s, ■■■ or ■■■, yeah.

8 Q. And you were collecting pieces of debris and putting
9 them into baggies all along; is that right?

10 A. Right.

11 Q. Do you have that with you?

12 A. Yes.

13 Q. Do you also have an exhibit that shows the flags on it?
14 I think you had your surveyor plot those flags?

15 A. Yeah. Oh, that's the bigger one, the one that folds?
16 Because I had the folded one and then the eight and a half by
17 11 size.

18 Q. Do you have that with you?

19 A. Yes. I can show you the eight and a half by 11 real
20 quick because that's -- that's these first two pages, but the
21 folded one -- that will take a minute. Here it is.

22 Q. That is it?

23 A. Yes.

24 Q. Would you open it up and just demonstrate it, as I
25 recall it to the jury that you've got -- show the jury how

1 the flags are plotted. Are these the ones that show the
2 paths of the tires?

3 A. Yes. If you look up -- if you look closely in this
4 thing -- I can't even read the numbers the way it's plotted,
5 but there are flags from near the edge of the pavement all
6 the way out here to the trip point to represent the tire
7 marks, the tire tracks.

8 And then there are flags that begin here and
9 they're carried all the way through to this point which is
10 where the indentation was in the ground, this point being the
11 last glass or debris, and then we've got the rest position
12 which is also a flag. I've got a list that will identify the
13 numbers. They are a little hard to read on this because --

14 Q. Thank you. You can fold that up. [REDACTED] what you
15 were trying to engage in, as I understand it, was to mark
16 every place that you found a particular type of debris and
17 then analyze it, measure the glass to see whether this glass
18 came from a windshield, from a side window, from a hatchback,
19 that kind of thing; is that correct?

20 A. That's correct.

21 Q. And that was an attempt to recreate, as I understood it,
22 the rollover sequence; is that correct?

23 A. If we could, yeah. I didn't know ahead of time what it
24 was going to turn out, so that's why we had to make that --

25 Q. Did that turn out to be useful to you?

1 A. It turned out to tell me what I've indicated, that we've
2 got the side door glass broken right away and fairly soon
3 after it the sun roof so it tells me that the sun roof and
4 back hatch, that was another early mark, were all broken
5 pretty much in the first landing.

6 Q. All right, sir. What do those later flags tell you,
7 however? I mean, aren't they -- aren't the materials
8 contained a complete mixed bag of everything, practically?

9 A. Yes. After that you begin to -- what I'm talking about
10 from there on is just identifying what was there. And it
11 just tells me that we had debris from the first impact that
12 scatters all along the path up until wherever that was, about
13 the end of the second roll.

14 Q. And the point I'm trying to make in terms of the
15 analysis that gives you or the information it lets you have,
16 do you recall flags through essentially were a mixture
17 of sun roof side glass and hatchback and you couldn't tell
18 which side?

19 A. You can never tell which side, that's for sure because
20 the two-side glasses are the same. But what were the
21 numbers, --

22 Q.

23 A. yeah, has -- all right. This has tinted -- the
24 quarter glass on the side -- oh, okay, some painted part from
25 the hatch, the back hatch and a little bit of sun roof, so a

1 little of everything is at [REDACTED].

2 Q. And [REDACTED] again has side glass rear hatch and sun roof?

3 A. Right.

4 Q. And [REDACTED]?

5 A. Yes.

6 Q. Has the same?

7 A. Yes.

8 Q. And [REDACTED] has the same?

9 A. Right.

10 Q. And [REDACTED] has the same.

11 A. Okay. I don't find any more quarter glass but the other
12 is there, yes.

13 Q. All right, sir.

14 THE COURT: How much longer do you anticipate?

15 MR. [REDACTED]: Judge, probably 30 minutes. I'll try
16 to cut it down to 15.

17 THE COURT: We'll break for the evening then.
18 Ladies and gentlemen of the jury, we'll take a recess until
19 9:30 in the morning. 9:30. You may be excused.

20 (Whereupon, the jury was excused from the courtroom, and
21 the following proceedings were held in their absence.)

22 THE COURT: [REDACTED], you indicate -- have
23 indicated several times, but in the last time in this -- in
24 your brief in support of your motion for directed verdict,
25 you say NHTSA has made it clear that automatic belts may be

1 [REDACTED]: No, sir, I don't, as long as there is no
2 speaking. I don't have any problem with that, Judge. It's
3 just, of course, with the Court's discretion. But as long as
4 there's no speaking, we don't have any problem with the court
5 reporter not going down there.

6 THE COURT: Or making any other kind of record?

7 [REDACTED] Right.

8 THE COURT: Okay. Are you ready to continue?
9 Bring in the jury.

10 (Whereupon, the jury was brought into the courtroom, and
11 the following proceedings were held in their presence.)

12 THE COURT: All right. You may proceed.

13 [REDACTED],
14 called as a witness on behalf of the Defendants, being
15 previously duly sworn, testified further as follows:

16 CROSS-EXAMINATION (CONT'D)

17 BY [REDACTED]:

18 Q. Thank you, Your Honor. Good morning, [REDACTED].

19 A. Good morning.

20 Q. A couple of small points very quickly, sir, and we'll
21 get into some of your speed calculations, okay?

22 A. Okay.

23 Q. First of all, [REDACTED], we've had your exhibit put
24 back up here, which the jury has seen before. If I
25 understand correctly, sir, this was prepared as a result of

1 your second visit to the scene?

2 A. Yes, the second visit information is included, yes.

3 Q. And that's of '92; is that correct, sir?

4 A. Right,

5 Q. And on that occasion [REDACTED] the coroner of
6 County who the jury has heard from, came by and had
7 some general recollections about the scene and verified the
8 location of the vehicle for you?

9 A. He -- yeah, he did come by, yes.

10 Q. All right, sir. And am I correct, in terms of him
11 talking to you about what his recollection of the scene was?

12 A. I don't remember all the details, but I do recall that
13 he generally concurred that the rest position I found was
14 about right and things like that.

15 Q. Okay. All right, sir. And we were discussing
16 yesterday, and won't go back into it at all in any detail,
17 the debris analysis that you did, the bagging, the various
18 things that you collected, and making the flags. You showed
19 the jury at my request a document smaller, but similar to
20 this, but with the flags superimposed on it; is that right?

21 A. Yes. I didn't feel like we'd be able to tell what was
22 going on if I left the flags on this.

23 Q. All right, sir. Essentially, on the other document, the
24 flags follow and indicate where debris was located; is that
25 right?

1 A. Yes, sir.

2 Q. Now, we talked about also the fact that many of those
3 baggies contained glass from all over the car and repeatedly
4 so, and I take it that those do not help you locate the
5 vehicle in any particular location at all, did they?

6 A. No, they don't.

7 Q. Okay.

8 A. Well, they do initiate the start.

9 Q. That's what I was going to ask you about. What you
10 really learned from your debris analysis, is it not, is where
11 the first impact was?

12 A. That's the main thing we learned from this collection.
13 Now, if we had found different ways that glass was located on
14 the ground, we would have had different conclusions. But it
15 merely tells us where it starts.

16 Q. After the start, it was pretty inconclusive the rest of
17 the way; is that right?

18 A. Well, except for some of the other debris like the door
19 handle, there were some other elements that were around.

20 Q. The glass analysis itself was fairly inconclusive after
21 the first impact?

22 A. After the first impact area, yes, but that was the
23 purpose.

24 Q. Now, you did request from Nissan and received technical
25 information about the thickness of the glass in each location

1 of the vehicle; correct?

2 A. Yes. They provided me with production drawings of all
3 of the glass components that I asked about.

4 Q. Okay. Yes. Aside from the frontal crash tests that you
5 were offered but didn't use -- didn't need in a rollover
6 case, as I understand it, do you know what other technical
7 data still exists on the 1989 Nissan Sentra?

8 A. Frankly, I don't. I didn't get into a whole lot. I got
9 the specifications of the vehicle from the MVMA and I didn't
10 push for a lot more information because I didn't need much
11 more.

12 Q. All right, sir. Now, on the same visits -- excuse me.
13 On your first visit, when the -- I think you said that the
14 grass in some areas -- just so we'll know about skid factors
15 in a minute, the grass in some of these areas was knee high
16 and even waist high; is that correct?

17 A. That was back in

18 Q. Yes, sir, on the first visit?

19 A. Yes.

20 Q. On that same visit is when you saw the car?

21 A. Correct.

22 Q. And you mentioned, we talked about the thickness of this
23 cup that holds the gasket on the sun roof, do you recall
24 that?

25 A. Oh, the flange, yes.

- 1 Q. Flange, very good. I referred to it as a cupped area.
- 2 A. Yes, sir.
- 3 Q. Did you happen to measure the thickness of the roof
- 4 itself, the entire roof?
- 5 A. The thickness?
- 6 Q. Yes, sir.
- 7 A. Not with anything to measure with, no.
- 8 Q. And by that I mean, I think we know what we're talking
- 9 about, you spoke of the thickness of the flange.
- 10 A. Right.
- 11 Q. Do you know what the thickness of the entire roof there
- 12 is, where the flange goes to the roof and continues?
- 13 A. Not by measurement. It just would have been my
- 14 recollection of what I saw.
- 15 Q. What is your best recollection, for the jury?
- 16 A. The roof is, perhaps in that area, an inch and a half
- 17 separated from the outer skin to the inner skin, and then
- 18 there's the flange that is folded or bent in to pick up the
- 19 gasket and all the attachments for the sun roof, and then
- 20 there's the lip that's turned up, which is the part that we
- 21 saw the indentation on.
- 22 Q. Assuming the glass out of the roof, any object moving
- 23 into the flange would first meet the flange area or the
- 24 cupped area, and that's a thickness of how much?
- 25 A. The thickness?

1 Q. Yes.

2 A. The thickness of the metal is probably 30 thousandths of
3 an inch.

4 Q. No, sir, I mean the flange itself?

5 A. Oh, the height of the flange looks like it's bent up a
6 quarter of an inch higher, maybe more. It's probably metric.

7 Q. And that logic, if it continued on, would hit the roof
8 an inch and a half thick, by your estimation?

9 A. If you continued to deform, you would start the roof
10 section, which is probably an inch and a half apart. It
11 isn't solid. If you picture the way the roof panel has to
12 be, it's a sheet steel pressing, and the inner and outer
13 would be put together and spot welded along that flange. And
14 then the flange turns up to carry the gasket.

15 Q. As it exists, about an inch and a half, however, you're
16 saying it's not solid from top to bottom?

17 A. It's an open section. It's the way you do sheet metal
18 structure.

19 Q. Very good. I want to ask you some questions now, sir,
20 about your testimony as I understood it, regarding maneuvers
21 that you believe that [REDACTED] took, and also the
22 speeds involved in some of your calculations, okay?

23 A. Yes, sir.

24 Q. And I'm going to ask you, rather than get you down here
25 and complicate that, I'm going to try to point to the right

1 place and you verify that I have, would you, please?

2 A. I'll try.

3 Q. You mentioned in your testimony, sir, about [REDACTED]
4 having performed a hard cornering maneuver; is that correct?

5 A. Yes, sir.

6 Q. And I think you indicated she was not quite sliding; is
7 that correct, sir?

8 A. Well, in the hard cornering maneuver, it isn't truly
9 sliding, but it's a very hard energy -- it's a very high
10 energy delivery from the tires.

11 Q. Right.

12 A. It doesn't quite slide. They are still rolling and
13 that's the way you make high severity turns.

14 Q. The tires, in fact, were rolling in the direction of the
15 turn?

16 A. Well, they're rolling, the vehicle is operating at a
17 thing called the slip angle, which is why the tire marks
18 become so strong and become black and they start to squeal,
19 because the tire is pointed off -- let's say pointed off to
20 the left. And it's not quite moving to the left, it's moving
21 at an angle.

22 And that's how -- that's how tires generate side
23 force, that's the way that every one works, but in the high
24 severity where you get large slip angles, now you start to
25 get noise, tire marks, and you start to get very severe.

1 cornering accelerations.

2 Q. So we have a situation where it's not quite sliding and
3 it is rolling, but there is some angular force taking place;
4 is that right?

5 A. That's correct.

6 Q. I'm sorry?

7 A. That's correct.

8 Q. Tell me where I should point to this in terms of where
9 you have designated here where you think [REDACTED] made a
10 hard cornering maneuver?

11 A. The start of the hard cornering maneuver would be in the
12 area of the third or fourth vehicle template and --

13 Q. Right here?

14 A. What you need to consider is that that's the closest to
15 the area where she goes off road. If, in fact, she was off
16 road, it could be a little closer to the right-hand edge.

17 Q. Am I correct in --

18 A. In that area, yes.

19 Q. Okay. And we'll explore this 125 feet that you've done
20 in just a second.

21 A. Okay.

22 Q. But I want to be sure the jury will know where you're
23 talking about a hard cornering maneuver. Okay, sir. Would
24 you tell the jury what a critical speed means at that turn
25 that's critical to you, the --

1 A. Critical speed is a speed that's used by police
2 investigation people to indicate a speed on a turn at which a
3 vehicle would experience a lateral acceleration equal to the
4 sliding friction.

5 Q. In lay terms?

6 A. It's sort of a way to figure out the fastest that
7 vehicle could have gone on that turn and stayed on the curve.
8 It's a law enforcement way to prove minimum things for the
9 ability to make an arrest.

10 Q. I got you. If I understand what you're saying, and see
11 if I do, if you reach the critical speed on a curve like
12 this, you're going to lose control outside of the curve
13 instead of inside the curve; is that correct?

14 A. That's -- that's the theory, and according to the law
15 enforcement approach. But, in fact, the vehicle may have a
16 higher limit of controlability than the slide friction
17 factor, and it may be lower. This one probably is pretty
18 close to it, so in this case that's probably a fair
19 assessment.

20 Q. Okay.

21 A. If you were going too fast for this turn, you should end
22 up outside.

23 Q. You've come this way, and if you're going too fast for
24 the curve, you're going to continue going this way instead of
25 coming in inside?

1 A. Yeah. The reason there is you're going too fast to be
2 able to get around the turn.

3 Q. All right, sir.

4 A. And, therefore, you run a wider turn.

5 Q. All right. Now, I think your testimony was that the
6 most probable speed you could assign here was 68 miles per
7 hour, and I believe that was at the time of the correction;
8 is that correct?

9 A. Yes.

10 Q. And by correction we're talking about, we're supposing
11 some sort of reaction to a dip off the road or something ;
12 right?

13 A. That's right. I've tried to show the one that's closest
14 to where the -- where the vehicle did eventually leave the
15 road.

16 Q. Right. And we're talking about where -- you're talking
17 about speed at the hard cornering maneuver and your most
18 probable speed was 68 miles per hour at that point?

19 A. That's right.

20 Q. And your range, however, that you got the average from
21 68 was from 61 miles per hour to 71 miles per hour; is that
22 correct?

23 A. Yes, sir.

24 Q. And I want to explore with you how you arrived at that
25 range, please.

1 ████████ And, Judge, with your permission, I
2 would propose to write on this pad here and let
3 stay there, because I believe he might need his notes.

4 BY

5 Q. Am I correct, ██████████, that what you did was work
6 backwards from the rest point of the vehicle; is that right?

7 A. Yes, sir.

8 Q. And is that designated by the last rectangle here?

9 A. Correct.

10 Q. All right, sir. The -- am I correct that the first
11 distance we're talking about or the first area of interest is
12 from the resting point to the tripping point?

13 A. That's correct.

14 Q. Where you believe the vehicle began to rollover;
15 correct?

16 A. That's correct.

17 Q. And can you tell me where that is, please?

18 A. It's --

19 Q. Am I close?

20 A. Come just one -- right there.

21 Q. Right here?

22 A. That's fine, yes, sir.

23 Q. And essentially, of course, we're talking about a
24 calculation from this point at rest to this point of trip;
25 correct, sir?

1 A. Right.

2 Q. And I believe you have that as 176 feet?

3 A. Yes, sir.

4 Q. And then you have to use, I believe what you called, a
5 deceleration value; is that right?

6 A. Correct.

7 Q. Is that kind of -- is that also a drag factor, is that
8 the same thing?

9 A. Yes, sir.

10 Q. Okay. And you're talking about the characteristic of
11 the terrain, whatever it is, to slow down something; is that
12 right?

13 A. And the activity of the vehicle, yes.

14 Q. All right, sir.

15 A. Yes.

16 Q. Now, you assigned a range, I believe, of a drag factor
17 from this area of the trip to the roll; is that correct?

18 A. That's correct.

19 Q. And what was the range that you used?

20 A. .4 to .6.

21 Q. I put "DF" for drag factor.

22 A. Okay.

23 Q. All right, sir. Now, why do you have to use the range,
24 first of all, instead of a definitive number?

25 A. Well, because we don't know exactly what -- what that

1 terrain did to the vehicle. I -- you know, I don't know
2 exactly how many times it dug up the soil, I don't know
3 exactly what drag factor is present that day, how wet it was,
4 so this kind of a factor takes those things into account.

5 Q. It also takes into account, doesn't it, the fact that
6 part of this is dirt, part of it is grass, there will be
7 differentiations like that?

8 A. Those things make it a little less easily defined so
9 it's necessary to put a fairly broad range.

10 Q. All right, sir. And using that drag factor, that range,
11 you come up with a range of speed that you believe occurred
12 between the trip and the rest; is that correct?

13 A. Yes, the calculation would give you the trip speed.

14 Q. All right, sir. And that was, is it not, 46 to 56 miles
15 per hour?

16 A. That's correct.

17 Q. All right, sir. Now, working backward, next you go from
18 the trip point to what, sir?

19 A. To the point the mass center crosses over the edge of
20 the pavement, and that's another 74 feet.

21 Q. Right, sir. And when you talk about the mass center,
22 you're essentially talking about the middle dot, more or less
23 middle in the rectangles you have drawn; correct?

24 A. Yes, there's a little blue line that crosses the mass
25 centers that connects the mass centers. And where that

1 crosses over the pavement that indicates about 74 feet.

2 Q. And if you can help me again, please, the blue line
3 here?

4 A. Yes, right there. That's where the point would be.

5 Q. Okay. 74 feet from here to the point of trip; correct?

6 A. Yes, sir.

7 Q. And in terms of -- maybe this will explain it better.

8 As I understand it, in terms of the officer's measurements
9 versus yours, am I correct, do I understand it right that he
10 may have measured simply more or less the point where the car
11 came off the pavement?

12 A. Yes. His -- my understanding of the way his
13 measurements were made is what he could see off road
14 excursion distance, that 280 feet. So you have to back up to
15 where that front tire comes off the pavement.

16 Q. Right here?

17 A. Oh, toward -- yes, that's the -- about where that arrow
18 crosses, in that area there.

19 Q. About right here?

20 A. Yeah.

21 Q. Okay. So the officer is measuring from here to here, to
22 the point of rest?

23 A. Right.

24 Q. You're measuring point of rest to trip, and then your
25 next 74 feet is the point where this blue line crosses;

1 right?

2 A. Yes. I'm trying to cover where the factors change that
3 affect the vehicle drag and he's recording what's there.

4 Q. He's recording the distance, so, essentially, if he
5 talks about something leaving the road, he's talking talking
6 up here, you're talking about the center mass line; right?

7 A. I'm trying to make a calculation, he's recording what he
8 saw.

9 Q. If you know the scale here, what is the approximate
10 distance between -- what does that represent?

11 A. It should be about 30 feet. An inch is five feet, it's
12 about six inches.

13 Q. Okay, about 30 feet?

14 A. Sort of like that, if you stick your thumb out from the
15 base of your palm.

16 Q. Now, sir, from this portion that is the shoulder to the
17 trip, what is the drag factor that you used?

18 A. Here. It's a range of .50 to .65.

19 Q. All right, sir. And again, why is the drag factor
20 different in this area than in the first area?

21 A. Well, there's two things happening. One, we're yawing
22 into the -- into the side -- side slip mode and we're digging
23 into the turf, and eventually we do trip. And in a vehicle
24 like this it's going to take about a 1.5 to trip it.

25 So if you average -- I've made a little curve on

1 the diagram. If you average that out, it will give you about
2 a .65 as a sort of an upper range and five -- actually .53 is
3 a little more conservative. I used .50 just to keep things
4 nominal. But that takes into account the change in the --
5 whoops -- the change in the drag as you go into the -- into
6 the off-road area.

7 And then what -- it changes as the drag factor
8 changes up to the point of trip, where it has to be something
9 over a G, so it's an average over that distance. But if you
10 look at that little chart, it -- you can estimate that based
11 on the start and end values.

12 Q. All right, sir. And the drag factors that you're using
13 are based upon your training and experience and other
14 people's research as opposed to you going out and trying to
15 recreate this and test that; is that correct?

16 A. That's correct.

17 Q. And that's another reason you're using a range to try to -

18 A. Sure.

19 Q. -- get all the parameters in. Now, using this .5 to .65
20 drag factor for this 74 feet, from trip to coming off the
21 road, am I correct, you get a range of speed from 56 to 67
22 miles per hour?

23 A. Yes. Actually, the numbers are a little -- percentage
24 are a little higher than that, but those are the numbers I
25 gave you, 56 to 67, yes.

1 Q. All right, sir. Which is your estimate of the speed at --

2 A. Right there, yes, just as the vehicle comes off the
3 pavement.

4 Q. All right, sir. Now, sir, still working backwards,
5 first of all, and I'm going really from my notes on your
6 deposition, as well. Tell me if I'm wrong. First of all,
7 you worked from this point back to the start of
8 identification of yaw marks; is that right?

9 A. That's right. Those are the -- that was the 74 foot and
10 I think he said two inches, but I used 74 feet as the
11 distance for yaw marks on the pavement.

12 Q. And you used a drag factor of .2 to .3; is that correct?

13 A. Yeah. In this case, since we are in a hard turning
14 maneuver but not sliding, I've -- I've determined from
15 vehicle dynamics that the drag factor, the path deceleration
16 is in that order, two- to three-tenths. It's a lot lower
17 loss of speed at that point?

18 Q. A lower loss of speed?

19 A. Yes.

20 Q. Than as if you were truly skidding, for example; is that
21 right?

22 A. Right. If you were brake skidding, it would go back up
23 to seven-tenths or so.

24 Q. And am I correct that that gives you a range, if you're
25 going to use this from where those yaw marks start that he

1 measured of 60 to 72.6 miles per hour?

2 A. Yes. Yes, sir.

3 Q. All right, sir. Now, you did something different, as I
4 understand it, given that you didn't have any information
5 beyond what [REDACTED] had measured, you came up with an
6 estimate about the total yaw on the pavement?

7 A. Yes.

8 Q. Am I right?

9 A. Uh-huh.

10 Q. And, essentially, what you did was, still working
11 backwards, did your best to project backward up the road
12 where you believe the -- is the closest or the furthest?

13 A. The nearest.

14 Q. The nearest?

15 A. To where it comes off the pavement spot.

16 Q. Where you believe was the nearest point that the hard
17 maneuvering, cornering maneuver could have taken place; is
18 that right?

19 A. That's correct.

20 Q. And what you essentially did was go and forget about
21 this 74 feet. You used the first 176 feet we saw and then
22 the next 74 feet, and instead of using the distance to the
23 yaw marks themselves, you kind of left that out of the
24 equation; right?

25 A. I just made a separate computation that would add the

1 additional half second of response time.

2 Q. All right, sir. And am I correct you went essentially
3 from here --

4 A. That's correct.

5 Q. -- back to where we talked about before?

6 A. To about the -- yeah. I can't remember right now which
7 position that would be closest. That one, the one, two,
8 three -- about the fourth one, yes.

9 Q. All right, sir. And this represents a distance of 125
10 feet; correct?

11 A. That was the calculation I made. It frankly looks a
12 little longer than that, but that was the calculation I made.
13 I made -- added a half second is what I did.

14 Q. All right, sir. I'm going to not mark out but dot over
15 this because your 125 feet here includes that 74 feet; right?

16 A. That's correct. They are two individual calculations
17 of the end point.

18 Q. Okay. And so going from this rest point all the way
19 back to the first point that you designated, you used 176
20 plus 74 plus 125 and not this additional 74; correct?

21 A. That's correct.

22 Q. Okay. 175 feet gets us back up the road as we've said,
23 and what is the -- am I right that you used a .15 to .3 range
24 of drag factor?

25 A. Yes. I think you just said 175 and we were looking at

1 125, and that is the distance.

2 Q. Thank you. I'm sorry.

3 A. But .15 is the new number for the start up further on
4 the road and .30 still represents a value for down on the
5 edge.

6 Q. And that's the lowest drag factor you've used; is that
7 correct?

8 A. Yes. Yes.

9 Q. And even though one might expect that the roadway would
10 be the highest drag factor, what you're reflecting is that
11 the vehicle is turning, it's not really skidding?

12 A. That's right. It's not being braked significantly and
13 it's being slowed only because of the steering input.

14 Q. Okay, sir.

15 A. If it were being slowed by braking, it would have to be
16 even faster, and there's no indication of that.

17 Q. If this were meant to represent a hard braking slide of
18 the car, the speed would be much more than what we're talking
19 about; correct?

20 A. Much more.

21 Q. Okay. So your calculation here then on the 125 feet,
22 the start of this, in effect, the time when anything began to
23 go wrong, is 61 miles per hour to 75 miles per hour; correct,
24 sir?

25 A. Correct.

1 Q. And that's the range of speed that you would attribute
2 to [REDACTED] up here, right before the hard cornering
3 maneuver took place; correct?

4 A. Yes, sir.

5 Q. Now, you, of course, told us, when I asked you, that
6 your most probable speed was 68?

7 A. Yes. That's about the middle, and that seems to be the
8 most reasonable.

9 Q. And that's taken at the middle between 61 and 75; right?

10 A. Yes, sir.

11 Q. But that's an average, of course, is it not, and any
12 given one situation, isn't it true, sir, that the speed could
13 have been 61 or 62 all the way up to 75?

14 A. Oh, yes. That's why the range is there.

15 Q. Right?

16 A. You just asked me for the most probable, and it felt to
17 me like the most probable was in the middle.

18 Q. And that's because usually we go with averages when we
19 have a range; correct?

20 A. That's why I use a range, to try to cover the probable --
21 probable ranges.

22 Q. All right, sir. But even under your calculations and
23 from your perspective, it's your opinion that [REDACTED]
24 could have been going 61 miles per hour when trouble started?

25 A. Oh, yes, definitely.

1 Q. Okay. Now, your estimate of 125 feet is, of course,
2 crucial to your initial speed opinion; correct?

3 A. Crucial?

4 Q. Yes, sir.

5 A. Well, it's part of the -- it's an estimate that allows
6 me to make one further assessment. But even if I didn't, I'm
7 within a mile or so of that anyway.

8 Q. All right, sir. It does assume that she is yawing
9 through this whole distance; is that correct?

10 A. Yes.

11 Q. Okay.

12 A. Well, it begins with no yaw, and the yaw develops to the -
13 you know what I mean.

14 Q. It's a yaw from the point where it's straight to the
15 point where it leaves the roadway?

16 A. Yes. It's yawing and changing direction both in terms
17 of a side slip and a curved path.

18 Q. All right. Now, to be sure we differentiate between
19 what we said before about critical speeds, you're not at all
20 meaning to suggest that one could not negotiate this curve
21 quite reasonably at 61 miles per hour?

22 A. No, that's -- no, this curves critical speed would be a
23 lot higher than that. I don't remember what the radius of
24 the roadway is, but it's substantially bigger than the path
25 that was taken.

1 Q. All right, sir.

2 A. So that probably could have been, you know, with a
3 vehicle -- a driver capable of testing the vehicle to its
4 limits it's probably a 90-mile-an-hour turn or something like
5 that.

6 Q. All right. So there's no reason to believe that speed
7 in and of itself was a factor that caused what we see
8 happening here?

9 A. I don't know -- I'm not sure how speed may have entered
10 into whatever caused that initial thing.

11 Q. The initial thing?

12 A. That part I don't know. But the vehicle should have
13 been able to --

14 Q. Negotiate that curve?

15 A. The vehicle had the ability to drive that curve at both
16 those speeds.

17 Q. All right, sir. And you say you would have to get up
18 into the 90's where you would expect a skid to the outside of
19 the curving as opposed to a correction on the inside of the
20 curve?

21 A. I haven't made that calculation. If I could remember
22 the radius of the curving we could calculate it real quick.

23 Q. I'm not trying to hold you up, but the point is the
24 speed -- she didn't approach it under any of your ranges or
25 calculations; correct?

1 A. That's correct. Otherwise she would have never been
2 able to make it to the inside of the turn.

3 Q. All right, sir. So it's the jerk of the wheel to the
4 left itself rather than the speed that's the key factor
5 concerning -- that caused this rollover. Would you agree
6 with that?

7 A. Yes.

8 Q. Okay.

9 A. The speed -- you know, part of the job is to try to find
10 out how fast things were and I got that.

11 Q. I got you. I'm talking about the cornering maneuver,
12 the jerk is the key factor in that maneuver and not the
13 speed?

14 A. Well, the speed still is there. The speed determined
15 how far we went, is really how that came out.

16 Q. Sure. And I think you testified yesterday in terms of
17 determining why the hard cornering maneuver took place, that
18 is speculative, of course. But you mentioned
19 inattentiveness, dipping the wheel two or three inches off
20 and overcorrecting; correct?

21 A. That kind of a situation is something that can and often
22 does lead to a control difficulty.

23 Q. I think you mentioned other traffic.

24 A. Yeah.

25 Q. That we don't know at least at this point about.

1 A. To my knowledge, there is no eyewitness testimony that
2 helps us know what exactly happened.

3 Q. And other possibilities would be an animal?

4 A. Oh, I didn't -- yeah, I should have mentioned that,
5 maybe.

6 Q. Some of which would be blame worthy on [REDACTED] some
7 of which would not be; correct?

8 A. I couldn't address all of that. I think you've got
9 both.

10 Q. All right, sir. [REDACTED], yesterday you indicated
11 that at the time of your deposition you did not have an
12 opinion one way or the other as to whether this Nissan
13 restraint system was defective. Do you recall that?

14 A. I had not made any analysis with that, in that regard.

15 Q. All right, sir.

16 A. So I wouldn't have an opinion there. I try to separate
17 personal from expert opinion.

18 Q. At the time of your deposition, you didn't have an
19 opinion one way or another. My question is, do you have an
20 opinion today one way or the other?

21 A. No, I still have not made that comparison.

22 Q. All right, sir.

23 A. Or that analysis, I would call it.

24 Q. Okay. [REDACTED], I wanted to ask you then, based upon
25 your expertise in accident reconstruction, which I found out

1 yesterday at least in your case does include body kinematics;
2 is that right?

3 A. Yes, sir.

4 Q. Is that the proper term, body kinematics?

5 A. Occupant kinematics. When you start to use body you
6 start to get into the more medical, in my field, but we can
7 work with either one, as long as you and I come to an
8 agreement I won't give any medical information.

9 Q. I understand. You've testified as to occupant
10 kinematics in this case as an expert in that field; is that
11 right?

12 A. Yes, sir.

13 Q. And your background with General Motors for 31 years
14 also includes rollover testing, setting it up and analyzing
15 it?

16 A. Yes.

17 Q. Okay, sir. Now, do you agree, sir, that the Nissan
18 system, the restraint system we're talking about is designed
19 to be used by consumers with or without the manual lap belt?

20 A. I'm really -- you know, that's asking an expert opinion
21 in that area and I haven't done it, but I know it can be
22 separated that way.

23 Q. Let me ask you this way.

24 A. Outside an expert.

25 Q. Let me ask you this way: Do you know for a fact one way

1 or the other what the manufacturer's position is?

2 A. I really shouldn't address that. The manufacturer
3 should address that or somebody that has studied the design.
4 I haven't done that.

5 Q. What I'm asking you is in your work in this case, have
6 you learned the position of the manufacturer regarding the
7 safety of this vehicle, the restraint system, with or without
8 the lap belt?

9 A. Well, I've heard what -- what the manufacturer has to
10 say about it, but it's not helpful in my design analysis, if
11 I were to do that.

12 Q. Okay. Let me approach it this way, then, because I
13 don't think there's a dispute about this. Please assume for
14 the purposes of the question that Nissan designed this system
15 to be used by a consumer with or without the lap belt, okay?
16 That's the assumption I'm asking you to make.

17 A. Okay. I am not sure that that's true, but I guess I'll --

18 Q. You assume that, and we have to back it up with evidence
19 of it otherwise. Now, in your investigation of the car, sir,
20 you found a loading on the shoulder belt, did you not?

21 A. Yes.

22 Q. So --

23 A. Let me correct, I didn't find loading on the belt, I
24 found loading on the retractor, the gate or the opening for
25 the belt coming out of the retractor.

1 Q. I'm sorry. I didn't mean to misstate that.

2 A. Well, that's --

3 Q. You found loading on the shoulder belt portion of the
4 assembly, and it's down in the retractor; is that correct?

5 A. Right. The belt itself, I didn't find anything, but
6 down in the retractor portion there's a little opening where
7 the belt comes out.

8 Q. Yes, sir.

9 A. And that showed some abrasion.

10 Q. Okay. And what that told you was it was in use at the
11 time of this rollover?

12 A. That's what it told me.

13 Q. And you found no such loading marks on the lap belt,
14 which led you to conclude it was not in use; correct?

15 A. I concluded that also.

16 Q. Okay. Now, based on my assumption that it's the
17 manufacturer's position that the system is designed to be
18 used with or without the manual lap belt so long as the
19 shoulder strap is in place, what you found was a situation
20 fitting one of those two intended uses as I have asked you to
21 assume them to be?

22 A. The way you have asked me to assume them.

23 Q. Now, [REDACTED] obviously, we know that [REDACTED]
24 was decapitated by some mechanism; correct?

25 A. That's my understanding, yes, sir.

1 Q. All right, sir. And I ask you to assume that, then, if
2 you're at all uncomfortable with that, she was, in fact,
3 decapitated by some mechanism?

4 A. Yes, sir.

5 Q. And, sir, based upon your training and experience and
6 your background as we talked about it, you do agree that the
7 key to preventing occupant kinematics, body movement in a
8 rollover situation is pelvic restraint?

9 A. The key?

10 Q. Yes, sir.

11 A. It's one of the keys, one of --

12 Q. By that I mean a lap belt.

13 A. A lap belt, yes. Well, the lap belt purpose is ejection
14 prevention.

15 Q. All right, sir. And I was about to ask you and thank
16 you, absent such a lap belt, ejections are a well known
17 occurrence in rollover cases?

18 A. Yes.

19 Q. Okay. Now, I want you to further assume this then.

20 A. Wait a minute. Wait a minute. Let me back up. Ask
21 your question again. Absent --

22 Q. Absent a lap belt, rollover situations are known to
23 involve ejections?

24 A. I'm not sure I have the data that will answer all of
25 that, but I do know that rollovers produce a high number of

1 ejections.

2 Q. Yes, sir.

3 A. Whether a lap belt is used or not, I'm not -- I don't
4 have data for that.

5 Q. Okay. That's based on your rollover test that you did?
6 Well, I think we've -- I think we're in agreement on what we
7 need. Rollovers are associated with ejections of occupants?

8 A. Yes. And a lap belt is an ejection preventer.

9 Q. All right, sir. Now, I want you to assume, please, for
10 the purposes of my next question, that [REDACTED] was
11 decapitated by the shoulder restraint, the shoulder strap
12 during ejection from the vehicle. I know you don't know
13 that. There is evidence of that. So I want you to assume
14 that for the purposes of this question, that the shoulder
15 strap decapitated her, okay?

16 A. I -- I really don't have enough information to say that
17 and my observation --

18 Q. No, sir I'm not asking you to accept that proposition,
19 I'm asking you to assume it for the purposes of my question.
20 Make that assumption on my part.

21 A. I'll see if I can.

22 Q. All right, sir. Now, assume first that she was
23 decapitated by the shoulder belt. Assume secondly, as we
24 have established that the restraint system was being used in
25 one of the two ways that the manufacturer designed it to be

1 used safely, all right, sir?

2 Under those assumptions, isn't it true that the
3 restraint system that we assume has decapitated the driver,
4 has proven to be unreasonably dangerous?

5 A. I --

6 [REDACTED]: Judge, I'm going to object to this.
7 This is well outside the scope of his direct. He's now
8 asking about --

9 THE COURT: Sustained.

10 [REDACTED]: -- design issues and injury
11 causation.

12 BY [REDACTED]:

13 Q. Making the same assumptions --

14 [REDACTED]: Judge, I'm not trying to fly in the
15 face of your order, I want to see if I can do it otherwise,
16 making the same assumption.

17 THE COURT: You're not going to be able to if he
18 objects, and I assume he's going to object.

19 [REDACTED]: All right, sir. I had another
20 question, but I'll recognize the scope of the ruling.

21 BY [REDACTED]:

22 Q. Would you be able to give us any information of a
23 similar nature, sir, if the assumption said was that the
24 decapitation was caused by the sun roof during ejection?

25 [REDACTED]: Same objection, Your Honor.

1 THE COURT: I'm sorry. Repeat the question.

2 [REDACTED]: Yes, sir, I'm sorry. I'll withdraw it,
3 Judge. I was asking him to assume instead of this instance
4 the other proposition that's been put forward here, that the
5 decapitation of [REDACTED] took place by the sun roof
6 instead of the shoulder harness.

7 BY [REDACTED]:

8 Q. All right, sir? That would be the first assumption.

9 A. Okay. All right.

10 THE COURT: I don't -- I don't -- one of the
11 principles that you -- that the plaintiff was insistent on
12 with regard to this witness is that he didn't make any
13 investigation in that regard. And you didn't want him to,
14 and now you're going into it.

15 [REDACTED]: Well, Judge, what I'm -- all I'm doing,
16 sir, is asking him about the -- whether or not the mechanism
17 has proven to be unsafe given its intended use, assuming
18 facts that are in evidence otherwise, not the mechanism of
19 injury. That's why I was asking him to assume that, sir.

20 THE COURT: Go on to something else.

21 [REDACTED]: All right.

22 BY [REDACTED]:

23 Q. We spoke yesterday, [REDACTED], about General Motors
24 three-point passive restraint system that is in production in
25 cars now; correct, sir?

1 A. Yes, sir.

2 Q. Okay. Now, by definition, am I correct that that system
3 includes a pelvic or lap restraint? It can't be used as
4 intended by the manufacturer without the lap portion?

5 THE COURT: Go on to something else. It -- go on
6 to something else.

7 [REDACTED]: All right, sir.

8 BY [REDACTED]:

9 Q. [REDACTED], based upon your expertise in body
10 kinematics, your work experience at GM in rollover test
11 design and analysis and your work at GM in investigating
12 accidents, I want to ask you, sir, if it's not true that a
13 three-point passive restraint system would have provided
14 pelvic restraint for [REDACTED]?

15 THE COURT: Go on to something else.

16 [REDACTED]: Judge, I'm checking to see if I have
17 another question that's outside of this line. Judge, to be
18 within your ruling, may I ask permission with the witness to
19 go into safer practical alternative designs?

20 THE COURT: No.

21 MR. [REDACTED]: All right, sir. With those rulings,
22 Mr. [REDACTED], that's all I have. Thank you, sir.

23 THE WITNESS: Thank you.

24 REDIRECT EXAMINATION

25 BY MR. [REDACTED]:

1 Q. [REDACTED], you were asked several questions during the
2 cross-examination about the mark in the sun roof.

3 A. Yes.

4 Q. And the shape of that and so forth. And you were also --
5 you were also asked questions about its shape and so forth.
6 Can I ask you to come down, please, sir, and draw for the
7 jury the shape of that edge as it existed prior to the
8 accident, in other words, what it looked like when it was --
9 when it was new.

10 Here we go. Have you got one?

11 A. In order to show this in a sketch, what I'll do is just
12 show it as if we had cut a slice through it.

13 Q. Pull that leg back so the Judge can see it better.

14 A. A quick sketch of the slice through it. Now, what I've
15 done is try to indicate, if I took the openings, this is the
16 hole in the sun roof, and this is the flange, and just cut a
17 slice through it, from the top, this is what that thing would
18 look like. And that's not too far from about the right
19 scale.

20 The sheet metal of the roof has a pressed-in
21 portion that's below, so that the sun roof can be stuck in
22 there. And then it comes up and it's turned up in a little
23 flange, and that's about a 32nd of an inch thick steeling,
24 something of that nature. And then it points up, and that
25 carries all the way around the flange so that when you get

1 ready for it, you can put the ceiling's gasket around it.

2 That little red thing, I didn't quite draw it up to
3 it, but the red thing is where the ceiling gasket is. And
4 then when you put glass there for the sun roof on it squashes
5 the ceiling gasket so that it's tight and it doesn't make
6 wind noise.

7 But when you look at that flange, it's a turned up
8 steel flange. And in this view you're looking at the raw
9 edge of it. If you come in from this way, you're looking at
10 a section that's turned up a little bit and it's designed to
11 hold the gasket so that the gasket will keep the wind and
12 water seal.

13 Q. Either from that perspective or from an overview, can
14 you draw the shape of what you saw during your inspection?

15 A. When I got there, and after I took the gasket off, you
16 couldn't really see it when the gasket was on very well
17 because it's sort of thick.

18 But what you could see once the gasket is off is
19 that there's a little round depression in here, and that's
20 about -- oh, looks like about half or three-quarters of an
21 inch deep, so that this piece that I've shown here has been
22 pushed back about that three-quarters of an inch. And in
23 doing that, it sort of pulls it up a little.

24 It gets a little higher because the metal has to go
25 somewhere, so it goes from about a quarter inch high flange

1 to a little bit taller by the time it's pushed in.

2 If, for instance, we started here, it got pushed
3 back that amount, and from this direction, looking down on
4 top, it's got a rounded shape and it's about in the middle of
5 the opening.

6 Just to orient -- I didn't do this at first, but I
7 should have put the -- the arrow at the top here shows the
8 front of the vehicle; then, of course, this is the left side,
9 and we're looking down from the top, and this is the opening.

10 Q. Without getting into -- into what made that mark, could
11 you tell the direction that the force was coming from to make
12 it?

13 A. Yes. If you look at the flange -- if you look at the
14 way the flange is deformed, it looks like, according to its
15 original shape, it's been deformed by a force coming in at an
16 angle from the left and down -- from below, so it's sort of a
17 rising and -- I'm sorry, I said from the left, from the right
18 toward the left. And a little bit of a rising thing, because
19 the flange is a little bit up.

20 So it's a force that comes from inside the
21 compartment into the left edge of the opening.

22 Q. Now, as I understand it, when you got to the vehicle,
23 you -- this -- this gasket, this red gasket was in place?

24 A. Yes, it was in place all around, all around the opening.

25 Q. And that, in effect, served to cover up that

1 indentation?

2 A. It did. The gasket is quite a bit thicker and it didn't
3 show the indentation the way the metal does. The only way I
4 could find it or the way I found it was just to lift the
5 gasket off. And then --

6 Q. So during the course of your investigation, you actually
7 pulled the gasket back as part of the inspection?

8 A. Yes. Actually, once I got it up and saw that there was
9 an indentation there, then I peeled the whole thing out so
10 that I could see the whole flange. And that was the only
11 place that had an indentation. There were some other twist
12 deformations in the corners, but that was the only place that
13 showed a contact deformation.

14 Q. Now, have you seen the pictures of the vehicle that were
15 taken earlier in your inspection?

16 A. Yes.

17 Q. And did any of those show that gasket off?

18 A. All of them did until I got there. I was -- as I looked
19 at the old photographs I wondered where the gasket came from,
20 but it was off -- it was not on the sun roof. I think, as a
21 matter of fact, I looked back and it was laying up on the
22 hood or the instrument panel in the early photographs, so it
23 didn't get lost, but it -- it was back on the vehicle when I
24 got there.

25 Q. And do you have any information as to why it was put

1 back on?

2 A. I don't, it just got back on.

3 Q. Okay. While you're here at the board, if you would, you
4 were asked some questions about the vehicle movement and
5 again, without getting into injury, during the course of the
6 accident, you -- just today you indicated at least during
7 this slip that you were asked about by [REDACTED] that
8 [REDACTED] would have been moving away -- moving to the right?

9 A. To the right.

10 Q. What is the principle involved in terms of that kind of
11 movement?

12 A. Well, in this case it's response to acceleration. We're
13 seeing side acceleration or slowing, and the car, in effect
14 is slowing down. And what it has to do is slow you down. If
15 we were free sliding on a piece of greased cookie sheet, we'd
16 just slide over to the other door. But we're not we're
17 sitting on a seat.

18 And in this case we've got part of a restraint
19 system across part of our torso, so the tendency now is the
20 upper part of the torso feels that acceleration and leans
21 with the turn at the turn time. Now when the trip begins,
22 the lean becomes more exaggerated because the forces go up.

23 Q. What does the term "principal direction of force" mean?

24 A. When we talk about impacts, principal direction of force
25 is a way to identify the direction forces were applied in a

1 net or in an average sense for an impact purpose.

2 If you run into a wall, the principal direction of
3 force coming in is straight at you. If you were to run into
4 an intersection collision, the principal direction of force
5 would be at an angle, not from the side, because it would be
6 at an angle because of your own momentum and the momentum of
7 the striking vehicle.

8 But what principal direction of force does is
9 identify the direction relative to the cars that the
10 occupants will move in, move toward, they'll move toward the
11 principal direction. So if the principal direction of force
12 is coming in at me, I'm going to move toward it.

13 Q. Well, when she was skidding on the highway, where was
14 the principal direction of force?

15 A. Well, that wouldn't be considered an impact, but the
16 acceleration force would be from the side, so the tendency
17 would be to move, if we go back to a clock direction, the
18 tendency would be to move somewhat forward, a little bit
19 forward of like a 3:00 o'clock position so there would be a
20 little bit of forward component of the relative motion at
21 that time, but it would be largely toward the right side of
22 the vehicle.

23 Q. And would that be toward or away from the restraint
24 system?

25 A. Well, it's away from the restraint system except at the

1 hip, but the upper torso would be moving away from it.

2 Q. Now, how about doing the rollover -- a rollover phase.

3 Where is the principal direction of force?

4 A. Well, during the rollover there are two things that are
5 happening. One, you're rotating in a circular -- and the
6 compartment is turning over and over, and there's an angular
7 velocity that's encountered there that tends to take all the
8 loose pieces, including an unrestrained or a partially
9 restrained occupant, migrate toward a position away from the
10 center of rotation.

11 And in a rollover like this, the vehicle will
12 either rotate about the ground position or its own mass
13 center, depending upon where the actual rotation is going, so
14 the occupants tend to float off the seat toward the roof.

15 Q. And would that also be consistent with -- you pointed
16 out some contact marks in the door, would that be consistent?

17 A. Well, that's a different matter. Now you've got a
18 principal direction of force to deal with because if -- just
19 to quickly -- the contact damage on the door is the one
20 that's done while the vehicle is upside down and is striking
21 that left front corner of the hood and fender and the corner
22 of the roof.

23 When it's upside down doing that, now, so the
24 principal direction of force for the vehicle is into this
25 direction. Whoops, I've got it back -- into this direction,

1 and if we're upside down, that's going to cause the occupant
2 to have relative motion within the vehicle towards the
3 driver's door now and toward the roof rail in that area.

4 Maybe if I quick sketch that that would make more
5 sense because I'm waving my arms.

6 Q. Sure. We're running out of paper. Let me --

7 A. Maybe I can --

8 Q. I'll just turn it over, I think, maybe.

9 A. What I'll do is just translate it all into a right side
10 up position so that you can picture what I'm talking about.

11 A little on the crude side, but this is as if I was
12 looking -- if I opened up the hatch and looked into the
13 passenger compartment from the back. The steering wheel,
14 this is the seat cushion for now, and then the door on the
15 driver's side, the door on the other side, just a single line
16 for the glass in the side glass and a single line for glass
17 in the -- what I'm speaking of you'll remember there was an
18 impact damage on the left front fender. And if you are
19 looking at, assessing the principal direction of force that
20 would result from that, it would be like this. And I won't
21 put it right on there, but it means that the damage pattern
22 is pushed in that way when it was upside down.

23 What that will do is cause occupant motion opposite
24 to that. In other words -- where is the pointer -- in other
25 words, with respect to its original orientation, the occupant

1 will move opposite to the principal force direction of that
2 impact at that time, so wherever the occupant is in the
3 beginning, it will be thrust toward the upper right-hand --
4 upper left-hand corner of the vehicle.

5 And if you recall, that's where the damage to the
6 door was located and the sun roof damage is located. If, in
7 fact, the occupant were leaning to the right and loading
8 somewhat before that, then this impact would cause the
9 occupant to move toward those two areas.

10 Q. You were asked yesterday, [REDACTED] about a General
11 Motors system of passive belts. That system does not have a
12 motorized lap belt, the one that you were asked about, does
13 it?

14 A. It's not motorized in any respect, it's all manual.

15 Q. What is the Saturn Company, what -- what does that name
16 mean?

17 A. The Saturn is a brand new -- basically, it's a brand new
18 approach to making automobiles that General Motors
19 encountered -- took on about four -- four years ago or five.
20 It's a new compact vehicle.

21 Q. And would you tell the ladies and gentlemen of the jury,
22 please, what kind of restraint system that vehicle has?

23 A. Well, it has a motorized -- a motorized -- its passive
24 system is acquired with a motorized shoulder belt portion and
25 a manual lap belt.

1 Q. And do you know if General Motors uses that type
2 motorized system in any other of its vehicles?

3 A. It's in at least one of the imports, and I can't recall
4 which one. One of the Geo vehicles but no others.

5 Q. All right, sir. You were asked also about the retention
6 of tests and so forth. I think you said that you have never
7 worked for a Japanese company as an employee?

8 A. As an employee, no, I never did.

9 Q. But you, at your time at General Motors, when people
10 were testing a product in the developmental stage, I think
11 you said that sometimes that early testing was kept and
12 sometimes it wasn't, depending on the engineer or the test
13 involved?

14 A. Yes. Yes.

15 Q. Now, with regard to the tests, you realize that tests
16 were produced in this case?

17 A. Yes. I know they were produced, it just wasn't anything
18 I could really utilize in the work I did.

19 Q. But they were -- you've seen those tests?

20 A. Yes. Yes.

21 Q. And they are the same sort of compliance tests, with 208
22 that General Motors runs, are they not?

23 A. Yes. Yes.

24 Q. And General Motors would keep those tests just like
25 Nissan kept these compliance tests in this case?

1 A. Yes. Maybe the key thing there is, it's something
2 that's necessary and it's also something that represents
3 testing of a vehicle that you eventually built. A lot of the
4 developmental work is experimental ideas and designs that
5 maybe never happened.

6 Q. And then the last -- last area you were asked about, you
7 were asked why the company would have kept the drawings that
8 you used to identify the various glass particles. Do you
9 recall that?

10 A. Yes.

11 Q. And does General Motors and the other automobile
12 companies keep engineering drawings of that sort?

13 A. Well, engineering -- drawings of that sort are actually
14 detail drawings, and those drawings are what you need to make
15 the glass or the other pieces. So if you want to make some
16 more, you better have those drawings kept. Yes, you keep
17 those.

18 Q. Is that the reason that you would expect an automobile
19 company to keep drawings of that sort?

20 A. Yes. Yes. It's the way that you can have more parts
21 made from a new supplier or an old supplier.

22 [REDACTED]: [REDACTED] I believe that's all we
23 have, Judge.

24 RECROSS-EXAMINATION

25 BY [REDACTED]

1 Q. Quickly, if Your Honor, please. Sir, just to be sure
2 that this is understood. You've depicted this but, actually,
3 the -- what is taking place would be, if this thing were
4 entirely upside down; correct?

5 A. That's right. That's why it's difficult to orient
6 things and it's helpful because when we look at the vehicle
7 damage, it's usually on its wheels. It's helpful to at least
8 perceive how that might be applied when it was upside down,
9 how that would relate to right side up.

10 Q. All right, sir. And earlier, in response to
11 [REDACTED]' questions, you talked about much earlier in this
12 situation where the yaw is taking place or the turning
13 maneuver is taking place, some slight forward and to the
14 right movement.

15 A. Yes.

16 Q. And I think you indicated that that's -- that really is
17 not of any consequence in the occupant kinematics by the time
18 the person gets to the point of trip; is that correct?

19 A. Well --

20 Q. Has the body largely returned to where it was?

21 A. No, by the time of trip then the large force -- maybe I
22 didn't understand your question.

23 Q. Yes.

24 A. Up on the roadway that kind of lateral acceleration most
25 of us can maintain our position behind the wheel so hold onto

1 the steering wheel you might be leaning to the right a little
2 bit, but you'll be able to stay in your seat.

3 Q. Okay. [REDACTED] at that point is still in here. Her
4 seat not over to the right in the vehicle?

5 A. Well, it's hard to say. She would be experiencing
6 forces that would pull her to the right, but how far I don't
7 know. But at the trip that's a different matter, that is
8 definitely.

9 Q. Yes, sir. And that's my next question. During the
10 rollover phase you're talking about, away from the center of
11 rotation and essentially you said toward the roof; is that
12 correct?

13 A. Toward the right, initially -- well, there are two
14 things. I may have misunderstood your question. At the trip
15 point the acceleration would cause the driver to tip toward
16 the right.

17 Q. All right, sir.

18 A. And then as the rotation begins a roll, then the motion
19 will be away from the roll center toward the roof, the whole
20 body.

21 Q. All right, sir. And that's toward the roof from below?

22 A. Yes.

23 Q. All right, sir. And I believe in terms of talking about
24 the shape of this indentation that's described in the sun
25 roof -- no, I won't. Let's not go through that. In terms of

1 talking about the shape there, you indicated, did you not,
2 some crushing --

3 A. It is right there. Perhaps you could cut it off.

4 [REDACTED] Could you agree to my detaching this so
5 I can turn it around?

6 [REDACTED]: I'm sorry?

7 [REDACTED]: May I detach this so we can turn it
8 around?

9 [REDACTED] No, that's all right.

10 [REDACTED]: No, I said I would, and let's --

11 BY [REDACTED]:

12 Q. What you indicated, sir, if I understand you correctly,
13 was you showed the flange here, and you mentioned some
14 contact point where this is essentially crushed down; is that
15 right? And we'll talk about the direction here, but first of
16 all this structure is indented?

17 A. Yes. That's what the little lower sketch is for.

18 Q. All right. And you said from below?

19 A. And the side, yes.

20 Q. Yes, sir. And is your -- is that about right for your
21 arrow or do you need to --

22 A. Well, looking at the indentation, it was hard to be
23 exact on the angle. It's a fairly small position that --
24 it's an angle from below, and I can't define it any better
25 than that.

1 Q. I think you said the force is right to left and rising;
2 correct, sir?

3 A. Yes.

4 Q. Now, you were asked some questions about photographs and
5 the gasket, and I want to clear something up. You were
6 supplied with pictures taken by [REDACTED], were you not?

7 A. I'm not sure exactly who took them, but I believed that
8 to be the case.

9 Q. Some very early pictures which clearly showed this
10 gasket off; correct?

11 A. Right.

12 Q. And you're not trying to suggest that anybody was trying
13 to hide that fact or replace the gasket and cover something
14 up, are you?

15 A. I don't know why it was put back. But I -- actually, in
16 the early photographers I couldn't see the indentation. It
17 was not close enough to do that but I could see that the
18 gasket was not there.

19 Q. The gasket was not there in the first photographs and
20 likewise you've seen [REDACTED] [REDACTED]
21 photographs have you not?

22 A. Yes.

23 Q. And some of those clearly show the gasket off, and in
24 some of those the gasket is replaced; is that correct?

25 A. That's correct.

1 Q. And [REDACTED] testified and you weren't here, of
2 course, and don't have the benefit of it, but do you have any
3 problem with somebody taking pictures with the gasket off and
4 then placing the gasket on to see if that part fits and
5 photographing that as well?

6 A. I don't have -- I don't know -- I was just trying to
7 sort out why. I didn't realize that there was an indentation
8 there.

9 Q. All right, sir.

10 A. I don't know what he did.

11 Q. And are you the only person that's taken pictures of
12 indentations in that area?

13 A. I think I might have been the first one.

14 Q. You've seen other pictures of indentations taken by
15 other people, have you not?

16 A. Dr. [REDACTED] has seen it since, yes.

17 Q. All right, sir. And what about people on the other side
18 of the case, you've seen photographs, have you not, of
19 indentations in the area taken by them as well?

20 A. I really don't remember that.

21 Q. Certainly from the early photographs you were supplied
22 it was easy to see that the gasket -- where the gasket was
23 located, and it was very easy for you to take it off upon
24 your inspection; is that correct?

25 A. It wasn't any problem to take off. I was a little

1 concerned at first, but it looked like it had -- it was
2 pretty easy to take off once I grabbed it.

3 Q. All right, sir. Let's put it this way: Nobody had
4 glued the thing back or something like that, had they?

5 A. No.

6 Q. Okay. Now, you made a reference to [REDACTED] and her
7 having the shoulder belt on and the lap belt off, it's part
8 of the restraint system, do you recall saying that?

9 A. Oh, partial --

10 Q. She had on part of the restraint system?

11 A. With the shoulder belt portion, yeah, I was talking
12 about how that restrained the hip.

13 Q. Again I wanted --

14 A. Somewhat.

15 Q. I'm sorry?

16 A. Somewhat.

17 Q. Again, I wanted to be sure you don't have any difference
18 in your opinion about that she had the shoulder belt on and
19 not the lap belt on throughout this period of time we're
20 talking about, not just during the rollover, of course, but
21 up the road where you're talking about before?

22 A. Well, I haven't made the detailed study, but the
23 observation I have is that the belt -- the shoulder portion
24 was in place at the time of the crash.

25 Q. All right. And that constituting one of the two ways

1 you understand the manufacturer intends for this to be driven
2 safely?

3 A. Yes.

4 Q. All right, sir. Now, regarding -- and I won't switch it
5 again, I promise you, regarding the picture that you talked
6 about that was actually an upside down view turned right side
7 up, you talked about the force applied in there; is that
8 correct?

9 A. Yes.

10 Q. Okay. Assuming that that force you're talking about is
11 an occupant of the vehicle, they are not going to be -- based
12 upon your studies in occupant kinematics, there's not going
13 to be that kind of force from an occupant who has a belt
14 restraint on, is there?

15 A. Not to that degree, no, especially the door part.

16 Q. Now, we talked about again the GM three-point passive
17 system, and that is a passive system, is it not?

18 A. Well, in theory it is.

19 Q. You get in and you close the door and it's on you;
20 correct?

21 A. You can have it that way.

22 Q. Yes, sir. And you said it was manual, but I'm troubled
23 by manual versus passive. You can have it where the occupant
24 gets in the vehicle, closes the door and they have then,
25 although it's not motorized, it's passive in the sense that

1 they have a lap belt and a shoulder strap on, it's an
2 integrated system?

3 A. If you leave the belt plugged into the -- plugged into
4 the buckle end by the center, then you can crawl under the
5 belt and get in, yes.

6 Q. All right, sir. So it is a passive system, a passive
7 three-point system?

8 A. Oh, yes, it meets the passive requirement.

9 Q. All right, sir. You were questioned again, sir, and
10 this will be my last line of inquiry, about what
11 manufacturers maintain and what they destroy or don't
12 maintain pursuant to document retention policies; correct?

13 A. I'm not sure I know enough about document retention
14 policies, I don't think that's what I addressed. I just
15 addressed my experience.

16 Q. All right. Your experience being that some things are
17 discarded, some things are kept?

18 A. Yes.

19 Q. Okay. Depending upon the project engineer?

20 A. I would think that that would be one of the people that
21 could make that decision.

22 Q. What other people would be involved, normally, if you
23 know?

24 A. Well, the test engineer may also.

25 Q. What about higher up management in that regard?

1 A. I suppose.

2 Q. All right, sir.

3 A. There could be -- you know, there could be policy
4 prepared on that, too.

5 Q. All right, sir. So am I correct that in this case, when
6 you were retained to make your analysis, you did ask for
7 rollover tests?

8 A. I asked if there were any, yes.

9 Q. And you were informed that there were none such as you
10 have for GM and showed the jury; correct?

11 A. That's correct.

12 Q. And you talked about certain things, whether they are
13 necessary to keep or not, such as the compliance testing that
14 Nissan does have; correct?

15 A. Yes.

16 Q. By compliance testing, we're talking about their
17 compliance with Federal Motor Vehicle Safety Standards;
18 right?

19 A. That's what I understand, yes.

20 Q. It's necessary to keep that in the sense that they are
21 required by law to keep that; correct?

22 A. I think so. I'm not sure if it's a law requirement, but
23 it sure is a common sense requirement.

24 Q. Right, sir. But it's not necessary, it's not required
25 by law to keep developmental testing?

1 A. I really don't know what the law does there.

2 [REDACTED]: Thank you, sir.

3 THE COURT: Anything further?

4 [REDACTED]: I don't believe so, Your Honor.

5 Thank you.

6 THE COURT: You may step down. Call your next
7 witness.

8 [REDACTED]: Call [REDACTED]

9 THE CLERK: Sir, if you will just come right up
10 here. Step up, if you would, and if you will raise your
11 right hand, please. Do you solemnly swear that the evidence
12 you give in the case now before the Court will be the truth,
13 the whole truth, and nothing but the truth, so help you God?

14 THE WITNESS: I do.

15 THE CLERK: Have a seat, please. State your name,
16 if you will, for the record.

17 THE WITNESS: [REDACTED].

18 [REDACTED],
19 called as a witness on behalf of the Defendants, being first
20 duly sworn, testified as follows:

21 DIRECT EXAMINATION

22 BY [REDACTED]:

23 Q. Where do you live, Mr. [REDACTED]?

24 A. [REDACTED]

25 Q. And where were you born?

**Testimony {Excerpts} of Restraint System Design Specialists
in United States District Court
[Witness for Defendant]**

Direct Examination
{page 84 (*i.e.*, 878 to 879)}

Cross-Examination
{pages 85 to 93 (*i.e.*, 932 to 933,
944 to 957, and 965 to 966)}

1 that he uses. Is there any objection?

2 [REDACTED] I have no objection to that either, Your
3 Honor. I'm easy.

4 THE WITNESS: Sir, I think these give a fair idea
5 of the seat orientation, the restraint orientation relative
6 to the seat, where the belts come.

7 [REDACTED] Let me identify those, then. [REDACTED]
8 excuse me. [REDACTED], [REDACTED] and [REDACTED] Are there any
9 objections?

10 THE COURT: They are admitted.

11 BY [REDACTED]

12 Q. All right, sir. Thank you. Would you come down,
13 please, sir, Judge, if he may, using these, point out to the
14 jury the things you were talking about.

15 A. The -- in particular, the seat on this -- the Sentra has
16 wings, thigh supports and supports here in the -- alongside
17 the body, and you can also see how the seat comes up to give
18 support in the lower thigh area. You can see how the armrest
19 packages you, how the steering wheel comes in and really
20 captures you in the seat, captures you in the whole area of --
21 of the interior of the vehicle, interior package, and what
22 we're talking about, we say packaging of the occupant.

23 Here is a photograph that shows the area where the
24 belt goes. It's higher behind the driver's seat, and it's
25 behind the occupant, so it's a wraparound. The belt comes

1 across and goes back behind, some distance behind the driver.
2 The photograph -- these are not going to be as good because
3 you need a picture that reorients you, but you can see the
4 area here.

5 The retractor for the shoulder belt comes down
6 right on the seat, is mounted right on the seat right
7 adjacent to the hip so that there is a wraparound of this
8 belt right around to your body and right tight to your body,
9 so that represents the kinds of elements that are tucking you
10 into the seat, so to speak, and tucking you into the
11 restraint system.

12 Q. What other -- what other design features or improvements
13 does this system, the Sentra system, incorporate?

14 A. The -- well, as we look at -- you can't put these kinds
15 of systems in without all kinds of imaginative things coming
16 in. This is the retractor that goes alongside your seat and
17 attaches to your seat, so it moves with you.

18 In the Sentra your seat moves, this moves with you.
19 And this is a switch that if you are adjusting your seat, it
20 locks the belt out so that you -- so that you won't be
21 pressed up against your belt. Each of these systems comes
22 with all kinds of technology that represents an improvement.

23 The Sentra here, as I've gotten into it, represents
24 that it has moved with the technology to make this an even
25 better system than the Cressida would have been in its time.

1 Q. Okay. And are you aware of the fact that no rollover
2 tests have ever been done on the 1989 Nissan Sentra?

3 A. It's my understanding that that's the case, that's
4 right.

5 Q. Okay. Now, in explaining C-2, I believe we left out an
6 important step here. At each front outboard designated
7 seating position, you shall have a Type 1 or a Type 2
8 seatbelt assembly that conforms to Standard 209 and S.1
9 through S.3. 209 is the definition of Type 1; is that
10 correct?

11 A. That's right.

12 Q. Okay. And that would be this right here, it's a lap
13 belt for pelvic restraint.

14 A. That's right.

15 Q. And that's what Nissan chose to use as a manual Type 1
16 belt?

17 A. Yes.

18 Q. And by manual I mean not automatic.

19 A. That's right.

20 Q. Now, once you do that, you have to meet the requirements
21 of S.5.1 with front test dummies as required by S.5.1;
22 correct?

23 A. Yes.

24 Q. And it must be restrained by Type 1 or Type 2 seatbelt
25 assembly, or you may use the pelvic portion of a Type 2

1 seatbelt assembly which has a detachable upper torso belt;
2 correct?

3 A. Yes.

4 Q. And, in addition, you have to do it by means that
5 require no action by the vehicle occupant; is that right?

6 A. In addition to the means that are referred to up here.

7 Q. Right.

8 A. In addition to the means that you've already got in the
9 picture.

10 Q. Yeah, you have to have some means that require no action
11 by the vehicle occupant, right.

12 A. That's where it started, that's right.

13 Q. Right. Okay. Now, Nissan chose to use the automatic
14 two-point belt as the means they were going to use plus the
15 knee bolster?

16 A. That's right.

17 Q. Right? Okay. And that would be governed under S.4.5.3
18 as to automatic belts; correct?

19 A. It falls under S.4.5.3, that's right.

20 Q. Okay.

21 A. But you -- the certification selection -- this is where
22 your certification selection mode is. This is some
23 definitions of it and description of the automatic belt
24 system.

25 Q. Exactly. But the means that require no action by the

1 Q. So let me ask you, are you familiar with Plaintiffs'
2 Exhibit No. [REDACTED] which is "Spinal Injuries in Belt-wearing
3 Occupants"?

4 A. Sir, I had seen this as part of your -- the materials, I
5 think, in the case earlier. I don't know that I would call
6 myself familiar with it, but I have read it or read through
7 it.

8 Q. This involves a discussion of various kinds of belt
9 systems including shoulder belt only systems; is that right,
10 which would be about three pages over?

11 A. Yes.

12 Q. And, in particular, it describes some near decapitations
13 in at least two cases and then a number of other severe neck
14 injury cases in 19 -- in the 1960's with only shoulder belts;
15 is that right?

16 A. Well, I think there's a lot of other things. I think
17 there were -- the impact configurations are different.
18 There's -- there are different type vehicles, but there's an
19 awful lot of different areas discussed, yes.

20 Q. But it does describe, with shoulder belt system only, at
21 least two near decapitations.

22 A. That could be. I -- I've looked at them more from the
23 standpoint of the vehicles involved to see if there was
24 information on that.

25 Q. But it's your position that that is not relevant to

1 today's system because of the knee bolsters and the
2 encapsulation with the other occupant protection; is that
3 correct?

4 A. Absolutely, sir. If you go back through the vehicle
5 designs that you were looking at in these years and what we
6 knew about impact and how to design for it, there's no
7 question those designs wouldn't have included that.

8 Q. Okay. I want to likewise show you Plaintiffs' Exhibit
9 [REDACTED] and I believe I actually gave you a copy of that during
10 your deposition to keep, didn't I?

11 A. I think so.

12 Q. Okay. Now, would you agree with me that this article,
13 which is dated 1967, describes two complete decapitations and
14 one near decapitation with three cases using shoulder belt
15 only systems?

16 A. Sir, I've just not looked at them that way. I've --
17 we're talking about -- it's hard for me just to agree because
18 there's a lot of them -- I looked at this as a 1961 [REDACTED]
19 which is a ton of difference from where we are, and then I'm
20 looking at -- at the description of the systems.

21 As far as the trauma and the description of it, I
22 really don't have much feel for that unless you want me to
23 read it and respond to it.

24 Q. Well, if you want to take just a second to read over it
25 and respond to it, I think that will be fine, if it's all

1 right with the Judge.

2 A. Sir, this is an extrication, I mean, she fell out. She
3 was ejected with the -- I guess I don't have as much
4 information on that as I need. I -- what would your be
5 question be?

6 Q. Would you agree that case No. 1 is a partial
7 decapitation with a passenger in a [REDACTED] driven at
8 low speeds, and that there were no spots of blood seen on the
9 belt, and that it was a two-point belt?

10 A. It seems to be. I think what goes with that is that it
11 may be low speed, but it talks about it revolving several
12 times about its transverse axis.

13 Q. Which would describe a low speed rollover, wouldn't it?

14 A. No, not really.

15 Q. Or a spin, is this a spin?

16 A. It's -- whichever way, and it's hard -- I think you're
17 given such a brief description I don't know how you can tell
18 much, but whichever way it's going, you don't do much of that
19 unless you're going -- our low speed, I don't think you can
20 do that, what we think of as a low speed.

21 Q. Would you agree that case No. 2 is a 37-year-old-man in
22 a [REDACTED] with a shoulder belt only and that his injury is
23 described as a complete decapitation which had fairly smooth
24 edges and was done by the seatbelt?

25 A. But it says he was ejected through the door, so we have

1 a door issue here, too, that -- is that your interpretation,
2 too?

3 Q. Yes, that he was ejected through the door?

4 A. I think so.

5 Q. Okay. And in case No. 3, we have a passenger of an [REDACTED]
6 [REDACTED] with a two-point system that, likewise, the occupant
7 was completely decapitated by the belt?

8 A. And again we have a -- the car was crushed diagonally
9 with the result the left door opened and was thrown forward
10 and detached from the hinges. And it describes a 1966 [REDACTED]
11 [REDACTED] and it revolved it says, whatever that means, so there
12 was a lot happening.

13 Q. And would it be your opinion that this article is
14 irrelevant because of the knee bolsters and the added things
15 that have come about in the last few years?

16 A. I think just things like the belts we're talking about.
17 I think that in this period of time we're talking about a
18 different -- a different experience.

19 Q. Would that belt be in the [REDACTED], the new
20 belt, or would it have been the old belt in the '81 Toyota
21 Cressida?

22 A. You have new belts. New belt technology was in those
23 belts.

24 Q. Okay. And based on that, it's your opinion that those
25 articles are then irrelevant, in that sense, in that the belt

1 system is different, the knee bolsters didn't exist; is that
2 correct?

3 A. And beyond that, sir, you don't even have a good
4 definition of the accident and you don't have -- back -- it's
5 been the hardest thing to get good investigation so that when
6 you're all done you can do more than point to it and say,
7 it's a bad wreck. And that's kind of the way things were
8 back in those days.

9 And if you read these one-paragraph descriptions
10 out of it, that's about all you really get out of it you get
11 some dramatic observations but you really don't get anything
12 that helps you understand how this system operated, did it,
13 in fact, play a role in it, and, if so, how.

14 That would help you to understand how to tie it in,
15 if it, in fact, needed to be or was reasonable to be tied in.

16 Q. Are you familiar with the STAPP Car Crash Conference?

17 A. Yes.

18 Q. And what is that?

19 A. It's -- the conference is a set of conferences that
20 started back about 1955, I think. I've been to a number of
21 them. It's a conference where people interested in safety
22 issues, usually, and it's been broadening. We get more
23 attorneys all the time, and we have papers being presented on
24 research that's done all over the world, actually, are
25 presented in the conference.

1 Q. Okay. And did you ever attend any of those conferences?

2 A. Yes.

3 Q. Do you know whether or not Nissan ever attended any of
4 those conferences?

5 A. Yeah, they do.

6 Q. And it's considered a major conference, isn't it?

7 A. Yes, I think all the manufacturers are -- most all are
8 represented, and a lot of independent researchers also.

9 Q. I want to show you Plaintiffs' Exhibit No. [REDACTED] which is
10 an article by Dr. [REDACTED] Are you familiar with that
11 article?

12 A. Yes, I've seen it.

13 Q. And are you familiar that Nissan has this article
14 currently in their technical file?

15 A. I didn't know that, but I wouldn't be surprised.

16 Q. Okay. You would expect them to have it in there,
17 wouldn't you?

18 A. If you're talking STAPP conferences, that's a little
19 more likely because STAPP is a more widely published and
20 known. A lot of these others are in medical journals,
21 perhaps, and more obscure kinds of publications, and they
22 would not be as likely. But, yeah, I think we have been
23 inclined to be collecting at one place or another within the
24 various automotive companies these kinds of materials.

25 Q. Would you turn over to page [REDACTED] for me in that article?

1 Do you see where Dr. [REDACTED] discusses two-point diagonal
2 and shoulder restraints?

3 A. Yes.

4 Q. And would you agree with me that in this case he is
5 discussing injuries received by two-point diagonal shoulder
6 restraints?

7 A. Yes.

8 Q. And, particularly, in the second sentence, 21 were using
9 two-point cross shoulder diagonal belts, that's what we call
10 a two-point system, right?

11 A. Well, it's unclear to me exactly what cars he was
12 talking about that would have that system unless it was --
13 you know, a four-point system where they were all only using
14 the upper part of it.

15 Q. Okay. Well, it at least describes a two-point cross
16 shoulder diagonal belt?

17 A. That's right.

18 Q. That seems to describe at least what we've been talking
19 about for about four days, doesn't it?

20 A. I don't know what you've been talking about for four
21 days, but it doesn't describe what's in this vehicle. This
22 is talking about a system that -- this system wasn't around
23 then. This -- even at this point in time, you're talking
24 about known kinds of technology and positioning of things,
25 and it really is a lot different than we're dealing with

1 today.

2 Q. Are you telling the jury that the engineering principles
3 back then were different than they are now?

4 A. No, I'm saying that there -- we've come -- we've come a
5 long way. We've come from the point where back in this
6 period that he's talking about, you had manufacturers that
7 were building cars over in Europe that were, in many cases,
8 they didn't have any regulations or very few regulations.
9 Some countries had them, others had none.

10 So you had people that were buying belts off the
11 shelf and putting them in vehicles and a lot of that was
12 going on over there. We were just getting into belts here
13 pretty heavy about that time. So when we start looking for
14 system performance, we look for vehicles, we look for the
15 names of the vehicles because that starts to tell you what
16 the system was that you were dealing with.

17 When you talk generically about something that goes
18 from one side to the other on an angle, it doesn't tell you
19 anything, it doesn't tell you where -- what data you're
20 dealing from. It doesn't help you to make good design
21 decisions.

22 Q. Would you agree with me that in this article, going down
23 to the second paragraph of this same two-point diagonal
24 restraint system, that the author defines both upper, lower,
25 right, and left ribs were fractured in driver and passenger

1 and that there were cervical spine fractures that occurred in
2 four cases, were fatal in three, and that two cases were
3 associated with decapitation?

4 A. That's what he says.

5 Q. And would it be your contention that this article is
6 irrelevant to the [REDACTED] case?

7 A. If you're going to try and take this piece of paper or
8 series of papers and try and introduce them as having
9 relevance here, yes, I think they are irrelevant on that
10 basis.

11 On the basis of it being a STAPP conference paper
12 which raises it a bit, but what you don't know is whether at
13 this STAPP conference as that was researched it was
14 questioned and -- because at STAPP conferences people say
15 things and they don't always get agreement from everybody.

16 So you got to have more, you got to have data, you
17 got to have some references to things that people can use to
18 check your data, if you're going to use it as a source for --
19 for real input to design.

20 [REDACTED]: Do you have [REDACTED] Defendants' [REDACTED]?

21 BY [REDACTED]:

22 Q. Do you have Dr. [REDACTED]'s paper up there?

23 A. I don't know, sir. There we --

24 Q. [REDACTED], you have in front of you the paper you were
25 describing done by Dr. [REDACTED]?

1 A. Yes.

2 Q. And I understood, you even assisted in this project in
3 some collection of data; is that correct?

4 A. Not writing anything here because, ultimately, these are
5 all his own opinions. These are -- they weren't run by
6 [REDACTED] or anything. They were just his own, as an
7 independent researcher, observation of these things, so we
8 were gifted with his observations when he wrote it just like
9 everyone else.

10 Q. Would this paper be relevant to the [REDACTED] case?

11 A. It's certainly considerably closer. You have a
12 different system because this system went beyond where the
13 [REDACTED] was. [REDACTED] had an inboard lap -- or the inboard
14 attachment of the automatic belt was over on the console so
15 it gave you more freedom.

16 It was not as tightly tied as you are in this
17 design, so this design by virtue also of it having a tighter
18 seats -- seats with -- with the more shaping, the side
19 supports on the seat and everything, you really need to use
20 that when you're trying to assess the relationship of it, and
21 that's what I'm saying, is if you know the vehicles and you
22 have some information about the test, you can start to get a
23 sense of how it might input into this -- this design.

24 Q. I understand that. I think my question was is there
25 study relevant to the [REDACTED] case, at least more so

1 than these articles I've given you in the '60's?

2 A. Considerably, considerably more important to it.

3 Q. Okay. And this -- you've testified that the -- that the
4 Nissan system is essentially an upgrade and a later design of
5 the '81 Cressida Toyota system?

6 A. I think it has packaged advantages, yes. I think in
7 that time there were changes in customer looks at things that
8 allowed them to do things that were not available in the
9 Toyota.

10 Q. Would you turn to page [REDACTED] of Dr. [REDACTED] article? And
11 do you see the section that says discussion?

12 A. Yes.

13 Q. Do you agree with Dr. [REDACTED] conclusion in the very
14 last sentence that it is -- that it is -- of the first
15 paragraph that it is quite possible that at least one of the
16 fatalities, i.e., the neck fracture side glass ejection case,
17 would have been prevented had the manual lap belt been worn
18 in association with the automatic shoulder belt?

19 Q. Do you agree that that's what Dr. [REDACTED] concluded?

20 A. It's his opinion. I'm sure that I've looked at that
21 report. I don't know that I've come to an independent, you
22 know, conclusion on it, but it's possible.

23 Q. Well, [REDACTED] you agreed with the rest of his
24 conclusions earlier when [REDACTED] asked you, didn't you?

25 A. I don't think I -- I think I said this is Dr. [REDACTED]'s

1 study, it's his work that was done. It showed how the system
2 was being evaluated in a responsible fashion.

3 I didn't -- I don't think I said that I went
4 through it and I -- I concurred with everything that was said
5 every place in it, I don't think that's true.

6 Q. So you don't concur with the fact that one of the
7 injuries could have been prevented?

8 A. No, I didn't say that. I said as I sit here, even
9 though I'm sure I saw the whole report, which is about a
10 quarter inch thick, that I didn't sit down and look at it
11 from my own experience looking at the kinematics of it to
12 make that judgment.

13 He's a pretty qualified fellow, and he's giving you
14 his judgment, and that's what he says, and I don't quarrel
15 with the fact that it's -- it's a responsible person making
16 it. I'm just telling you that I haven't personally done what
17 I think I should do if I were going to say, I agree with you
18 on that accident, that that would have happened.

19 Q. Is this or is this not relevant to what a manufacturer
20 should know about [REDACTED] before they design a car for
21 her?

22 A. I don't think that any manufacturer -- [REDACTED] didn't
23 have this information available when they set out to do the
24 design to start with. I don't think any manufacturer has
25 that luxury. I think that what they do is put it together,

1 reach out like [REDACTED] did, reach out like these other
2 manufacturers have done using their best judgment and using
3 the best information available.

4 This came out too late, really, for -- to be used
5 as a primary basis for Nissan. The design decision to go to
6 this system had to have been made long before this paper was
7 out.

8 Q. [REDACTED], these other articles didn't come out too late
9 to have helped [REDACTED] did they?

10 A. I don't think they would have helped [REDACTED] one
11 way or the other.

12 Q. Would a pelvic restraint have helped [REDACTED]?

13 A. I don't know that. I think that's a biomechanic issue.

14 Q. And you wouldn't disagree with what a biomechanical
15 engineer or a doctor says, would you?

16 A. It depends on the doctor, it depends -- and -- the real
17 issue is I don't put myself up against -- against a medical
18 doctor and his medical opinions. I think you should have
19 those folks giving their opinions and not be taking engineers
20 and saying that doctor is a good doctor or whatever.

21 Q. Okay. Well, do you know Dr. [REDACTED]?

22 A. Yes, I do.

23 Q. And, in fact, he intends to testify in this case,
24 doesn't he?

25 A. Yes.

1 Q. If he gave an opinion hypothetically that had [REDACTED]
2 [REDACTED] been wearing a lap belt she would not have been
3 decapitated, would you disagree with that?

4 A. No. That's a different question than you asked before,
5 as I understand it, sir. And I think that if that's his --
6 if that's his opinion on it, that -- especially if he
7 believes that the injury or the decapitation occurred in an
8 area that would not have been accessible with a lap belt in
9 place, I think that's reasonable. It's probably so.

10 Q. Well, would you think the sun roof wouldn't be
11 accessible if the lap belt was in place?

12 A. In this system, as well contained as you are, I think I
13 would -- and I'm talking now in terms of generalities. I'm
14 saying it would be reasonable to me that -- if the belt is in
15 place, that you probably couldn't get there.

16 Q. Okay. Now, we've agreed that driving this car without a
17 lap belt is not a hazardous -- there's no hazard there in the
18 1989 Nissan Sentra, haven't we?

19 A. In the sense that we were talking about in our prior
20 discussion in the deposition and all that, the hazard as we
21 were approaching it. It's a hazard to drive a car on a road.
22 That kind of hazard is always there. Talking about there's
23 nothing about this vehicle that jumps out as a hazard to you
24 that says, if you don't have that -- that lap belt on that
25 you're in real danger. It isn't that way.

1 restraint to a lap restraint then that even decreases the
2 risk in a rollover more?

3 A. I think -- I think three-point systems are -- you know,
4 help to keep that number as low as it is, but we still have
5 serious injury in rollovers belted, too, so it isn't like
6 just preventing ejection means the world is rosey. It
7 doesn't work that way.

8 Q. And I believe I understood you to say that when you're
9 designing a seatbelt system, it's a series of trade offs; is
10 that right?

11 A. Yes.

12 Q. Okay. And what are those trade offs?

13 A. Essentially, they moved in the direction of comfort.
14 Probably the most effective system that we start with is like
15 a race car driver with a five-point system and he's just
16 locked into his seat and he just -- all his controls are set
17 up and limited and he's not going anywhere.

18 And then as I keep -- and he can handle rollovers --
19 not always, but to a lot better extent. Now you come along
20 and you want to make this thing something that everyone is
21 going to wear or that more people are going to wear, and so
22 now you got to start looking at the -- the types of locking
23 devices you've got, the restraining devices.

24 You got -- you've got things that we went through,
25 comfort clips at one time that we could adjust to try to take

1 the loading off your shoulder so you didn't get aching
2 shoulders and you didn't get cinched down in your seat, and
3 so there's a lot of things that have been done with geometry,
4 with mechanisms to try to make the belt just easier to use
5 for all those times when you're using it and nothing happens.

6 Q. And, of course, for every trade there's an opposite
7 consideration, and what is that opposite consideration?

8 A. There will be some accident somewhere where that aspect
9 of it might actually have played a role. In other words, if
10 in this move to make it possible for more people to wear
11 belts or be willing to wear belts, I make the retraction
12 force a little lighter -- maybe somebody wears a heavy coat
13 and maybe the belt doesn't pull down as much and maybe now
14 they move further and maybe now they are injured more than
15 they would have been, that's kind of where that argument
16 goes.

17 Q. Are you familiar with Defendants' Exhibit [REDACTED] Is that
18 in evidence? I want to show you what's been marked as
19 Defendants' Exhibit [REDACTED] and I don't think it's been tendered
20 into evidence, but are you familiar with that study?

21 A. I think I have seen it, but I don't really have a -- you
22 know, a full grasp. If you ask a simple question, maybe I'll
23 be able to catch it.

24 Q. Okay. Well, I've got a pretty simple question. If you
25 turn over to page 3.

**Testimony of Physician/Engineering Consultant in
United States District Court
[Witness for Defendant]**

Direct Examination
{pages 95 to 124R (*i.e.*, 1000 to 1059)}

Cross-Examination
{pages 124R to 133 (*i.e.*, 1059 to 1076)}

Redirect-Examination
{pages 133R to 135 (*i.e.*, 1077 to 1080)}

Recross-Examination
{pages 135 to 136 (*i.e.*, 1080 to 1082)}

Further Redirect Examination
{pages 136 to 136R (*i.e.*, 1082 to 1083)}

1
2 in open court.)

3 THE COURT: Jury all back?

4 THE MARSHAL: Yes, sir.

5 THE COURT: Are you ready for the jury?

6 [REDACTED]: We are, Your Honor.

7 THE COURT: Okay. Bring in the jury. Call your
8 next witness.

9 {Whereupon, the jury was brought into the courtroom, and
10 the following proceedings were held in their presence.)

11 [REDACTED]: Your Honor, we call Dr. [REDACTED]

12 [REDACTED]

13 THE CLERK: If you would just come around here, Dr.

14 [REDACTED] Come around and step up, if you would. Would you
15 raise your right hand? Do you solemnly swear that the
16 evidence you give in the case now before the Court will be
17 the truth, the whole truth, and nothing but the truth, so
18 help you God?

19 THE WITNESS: Yes, I do.

20 THE CLERK: Have a seat, if you would, please. And
21 if you would state your name for the record.

22 THE WITNESS: Okay. [REDACTED],

23 [REDACTED].

24 [REDACTED],

25 called as a witness on behalf of the Defendants, being first

1 duly sworn, testified as follows:

2 DIRECT EXAMINATION

3 BY [REDACTED]:

4 Q. [REDACTED], where do you live?

5 A. In [REDACTED], sir.

6 Q. And what is your occupation?

7 A. Physician and consultant.

8 Q. Do you have training in the engineering area as well as
9 being a physician?

10 A. Yes, sir, I do.

11 Q. Generally, tell me what you were asked to do in
12 connection with this matter, and then we'll go through some
13 of your background?

14 A. I think, basically, to review the facts of the case as
15 evidenced by the police report, EMS report, the injuries
16 sustained, the vehicle involved and to make some
17 determinations regarding the injuries sustained and how those
18 injuries came about in this particular accident, sir.

19 Q. Where are you employed?

20 A. In [REDACTED] with [REDACTED] Research Corporation,
21 sir.

22 Q. And do you act as consultant in that regard?

23 A. Yes, sir, I do.

24 Q. And tell the jury, if you would, what areas you consult
25 in.

1 A. I think primarily in four areas. One is the field of
2 biomechanics, which relates to the forces that apply to the
3 human body and how those forces result in injury to the body;
4 and the field of occupant kinematics, how a person or
5 individual moves about either inside or outside of a vehicle
6 during an accident; injury mechanism, what is it, what kinds
7 of forces are actually applied to produce injury; and injury
8 causation, where in an accident does an individual sustain
9 injuries.

10 Q. Are you registered as a professional engineer?

11 A. Yes, sir, I am.

12 Q. And in what state?

13 A. In the state of [REDACTED], sir.

14 Q. And are you also licensed as a practicing physician?

15 A. Yes, sir, I am.

16 Q. And in what state?

17 A. In the state of [REDACTED], sir.

18 Q. Let's start first with your engineering background. If
19 you would, [REDACTED] give the jury a summary of your
20 educational background in the engineering area?

21 A. Okay. In the engineering area, I attended [REDACTED]
22 University in [REDACTED] and received a Bachelor
23 of Science Degree in Mechanical Engineering in [REDACTED]

24 Continued in mechanical engineering and began to
25 sub- specialize in the emerging field of biomedical

1 engineering and received a Masters Degree in Mechanical
2 Engineering and with the emerging field of biomedical
3 engineering in [REDACTED].

4 Continued in graduate school and received a BHD
5 degree in Mechanical Engineering with a subspecialty in my
6 medical engineering in [REDACTED]

7 Q. Now, if you would, please, also describe for the jury,
8 have you had work experience in the engineering area?

9 A. Yes, sir, I have.

10 Q. And would you describe for the jury your work experience
11 in the engineering area, please, sir?

12 A. Throughout the entire time of undergraduate and graduate
13 school there were a number of employments that were held with
14 companies like the [REDACTED] Research Company, research
15 division in [REDACTED] [REDACTED] Company in
16 [REDACTED] [REDACTED] in [REDACTED]

17 And then following graduation I worked with an
18 organization called [REDACTED] Incorporated, which was a
19 moderate-sized life science research and development
20 organization in [REDACTED] doing head injury and spinal
21 trauma type of work, sir.

22 Q. All right. In the engineering area, are you a member of
23 any professional organizations?

24 A. Yes, sir, I am.

25 Q. And would you tell the jury what they are and what your

1 role is?

2 A. Primarily it's the Society of Automotive Engineers, sir.

3 Q. And are you also familiar and have you been involved
4 with and attended major conferences in the engineering area?

5 A. Yes, sir, that is correct.

6 Q. And can you give the jury some idea of what types of
7 conferences you've participated in and what the general
8 subject matter is or the nature of the subject matter of
9 those conferences?

10 A. Okay. Most of the conferences have either been through
11 the Society of Automotive Engineers or sponsored by that
12 body, conferences such as STAPP, S-T-A-P-P, automotive safety
13 conference dealing with automotive safety and issues of
14 automotive safety over a period of now probably since --
15 continuing those conferences since 1967, I think was the
16 first one.

17 Q. Let's go back for a minute, and, if you would, describe
18 for the jury your medical training, please.

19 A. Okay. After working with [REDACTED] Incorporated, in
20 [REDACTED] I decided to pursue a medical degree to
21 further understand how the forces and the injuries, how did
22 those things impact upon an individual clinically, what did
23 they translate into? What did these fractured vertebrae or
24 torn muscles or what have you, what did it mean to the
25 individual as a patient? How did it impact the individual?

1 So in [REDACTED] I enrolled in the University of [REDACTED]
2 Medical School in [REDACTED], and completed the M.D.
3 degree in [REDACTED] continued in postgraduate training from [REDACTED]
4 to [REDACTED] did an internship in obstetrics and gynecology.

5 From [REDACTED] to [REDACTED], did additional postgraduate work
6 in obstetrics and gynecology and then in [REDACTED] assumed
7 responsibility for a general or family practice in a rural
8 area called [REDACTED] sir, and have been involved
9 in a general family practice since that point in time.

10 Q. Would you describe that practice for the jury, please?

11 A. Yes, sir. It was a rural practice. We had
12 responsibility for about, I guess, 7500 folks in the town and
13 about 25,000 people in the county, and it was a, I guess what
14 I would consider to be sort of a classic rural practice. We
15 were responsible for covering the emergency room at nights
16 and on weekends.

17 Then it encompassed basically everything that one
18 might see in a rural practice from emergencies and automobile
19 accidents and field-type traumas, farm injuries, implement
20 injuries. And then we did everything I guess from OB to
21 pediatrics to adult medicine through geriatrics. We had a
22 nursing home practice as well.

23 Q. And did you continue that practice when you moved to [REDACTED]
24 [REDACTED]?

25 A. Yes, sir, I did. I continued the same type of general

1 practice.

2 Q. Do you presently hold staff positions at any hospitals?

3 A. Yes, sir, I do.

4 Q. And would you tell the jury what they are and also
5 generally what types of care and procedures you are entitled
6 to perform in those hospitals?

7 A. Okay. I hold staff privileges at the [REDACTED]

8 Hospital, [REDACTED] Hospital, [REDACTED]

9 Hospital and the [REDACTED] Medical Center in [REDACTED]

10

11 Those privileges include all types of medical care
12 including intensive care, medical intensive care, surgical
13 intensive care, have surgical privileges, do my own
14 C-sections, tubal ligations and first assist privileges on
15 any -- any procedure that can be done anywhere in any one of
16 the four hospitals.

17 Q. In your medical practice, have you also held staff
18 positions at any of those hospitals --

19 A. Yes, sir, I have.

20 Q. -- and facilities?

21 A. Yes, sir.

22 Q. Just generally describe what you --

23 A. Basically been on a number of what we call auto policy
24 committees that are responsible for the field of medical care
25 in the field of OB/GYN internal medicine, family practice,

1 have been Chief of Service of family practice at [REDACTED]
2 [REDACTED] Hospital and Chief of Staff at [REDACTED]
3 Hospital.

4 Q. In the medical area are you presently a member of any
5 professional organizations?

6 A. Yes, sir, I am.

7 Q. And would you identify those and tell the jury your
8 involvement in those, please, sir?

9 A. I think primarily the American Medical Association as a
10 national association and then a number of more local or
11 regional associations, the [REDACTED] Medical Association and our
12 local [REDACTED], [REDACTED] Spanish pronunciation, [REDACTED] County
13 Medical Society and also the [REDACTED] College of Family
14 Practice and the [REDACTED] College of Occupational Medicine.

15 Q. Now you used the term in describing some of your work
16 that you did at [REDACTED] and otherwise used the word
17 biomechanics. Would you focus in specifically on that
18 particular area of your background? Describe for the jury
19 first of all what it is and what your experience is in the
20 biomechanical area?

21 A. Okay. In the time frame when I was in [REDACTED] at the
22 undergraduate level in the [REDACTED]s, the field of
23 bioengineering, which is really sort of the application of
24 the principles of engineering and physics, mathematics, if
25 you will, to an understanding of what happens to the human

1 body, that field was emerging in that time period.

2 And my first involvement with it began with a study
3 of how the cables of the body, what are called the tendons,
4 the cables that actually transmit the force from the muscles
5 across the joints to produce motion, how those working as
6 structural elements with the whole idea toward prosthetic or
7 artificial limb design. How do we simulate these cables, if
8 you will, in the human body. So my first exposure was really
9 to understand the mechanical characteristics of those cables
10 in the human body.

11 ██████ at the time, was very fortunate in that we
12 were part of one of the first 13 units in the country to be
13 involved with what are called the multi-disciplinary accident
14 investigation teams, and I volunteered and worked on that
15 team. We had 13 in the nation. Because at that time the
16 federal government was beginning to realize that there was a
17 tremendous loss in terms of life, mobility, morbidity,
18 illness to people occurring in highway accidents. So 13
19 centers around the country were set up, and we would go out
20 as a multi-disciplinary team.

21 We had police officers, accident reconstruction
22 folks, people from the medical school, physicians,
23 anatomists, engineers, EMS folks or their equivalent in that
24 time period who would go out at the scene of an accident
25 right after it occurred and try to analyze what had happened,

1 how did the injuries come about, how did the accident come
2 about, what can be done to prevent these types of tragedies?

3 So also during that period of time we had an injury
4 and training grant that lasted for two years, and I was the
5 graduate student coordinator, and every month for two years
6 we had one of the leading folks in the world come down to
7 spend several days at [REDACTED] to help educate us about the
8 emerging field of automotive safety.

9 Q. Did you have any other involvement in automotive safety
10 during that period of time other than working at [REDACTED],
11 other than working on the multi-disciplinary accident
12 investigation team?

13 A. I think those were the main things. And part of the
14 engineering training grant, my major proffer certificate also
15 was involved as an automotive safety consultant and I did
16 work with him in some of his cases.

17 Q. In your professional employment, which you described
18 earlier, did you have occasion during any of that to be
19 involved in the area of mechanics of injury or injury
20 causation or any of those areas?

21 A. Yes, sir, I did. Following graduation, as part of a
22 Ph.D dissertation, I had done a study of head injury, trying
23 to explain how head injuries come about to the head. And
24 following graduation, I was asked to serve on the National
25 Institutes of Health Head Injury Committee, National Head

1 Injury Committee in _____ and for the time
2 period that that committee lasted, which was about a year and
3 a half, I worked with sort of a national head injury -- head
4 injury program.

5 During that period of time I became involved in a
6 few cases of this nature looking at automotive safety from
7 the injury causation standpoint.

8 Q. And during your employment following your professional
9 training, were there any other areas there in which you had
10 an opportunity to be involved in injury causation?

11 A. We did a great deal of work in injury causation. It was
12 not related necessarily to the automotive environment. One
13 of the projects that I spent four years on was trying to
14 understand the spinal injury problem that occurs when pilots
15 eject from a high speed aircraft.

16 The military was having a problem with their --
17 sort of their top gun pilots at that time in that if the
18 plane was wounded or damaged, let's say, and the pilot tried
19 to eject, oftentimes with the ejection forces, in order to
20 get the pilot out of the seat so rapidly to clear the tail of
21 the aircraft, we had to push him out, as you can imagine
22 very, very quickly. If you didn't push him out quickly
23 enough, the tail of the aircraft might hit them. If you put
24 them out too quickly, they were breaking their backs, so they
25 didn't want to send down their pilots in enemy territory with

1 a fractured back. That was very undesirable.

2 So for four years we worked on a project to try to
3 understand the mechanism of that, what role the restraint
4 systems played in that, what role the ejection process
5 played, and trying to prevent that particular injury.

6 Q. Dr. [REDACTED], after you went back to medical school and
7 received your medical training, how did those -- how did that
8 tie in with your professional training in the engineering
9 area?

10 A. During that period of time, I was working with the
11 neurosurgery department trying to understand the mechanisms
12 of coma. And I think the medical training helped me
13 understand what those injuries meant, in terms of what is --
14 how does it affect an individual from the clinical
15 standpoint.

16 Q. At some point in time, did you begin to be -- to consult
17 in this general area of biomechanics and injury causation and
18 so forth?

19 A. Yes, sir, that would have been in the [REDACTED] time period,
20 about 20, 25 years ago.

21 Q. And as you proceeded with your medical practice in that
22 area, tell us how those two related in terms of the time that
23 you spent and so forth?

24 A. I can, obviously, starting a medical practice most of my
25 time, would have been involved in the clinical practice of

1 medicine. There was always a period of time when I was doing
2 some consulting, but for the first several years, probably 98
3 percent of my time would have been in the clinical practice
4 of medicine.

5 Beginning in about [REDACTED] or so, somewhere in that
6 time frame, there has been a gradual shift into the
7 consulting practice which embodies the principles of both
8 engineering and medicine.

9 And today, currently, and probably for the last two
10 or three years, I guess, my percentage of time would have
11 been probably 15 percent in the clinical practice of medicine
12 and probably 85 percent in the consulting practice.

13 Q. What accounts for that shift in your time that you
14 allocate to these various areas of --

15 A. I think primarily that's the way my interest has
16 evolved. The cases over the years embody both backgrounds
17 very well, both the clinical and the engineering background,
18 and it's a very challenging field.

19 Q. Now, in this area of biomechanics, is the term "occupant
20 kinematics" used?

21 A. Yes, sir, it is.

22 Q. And tell the jury, we've heard a lot this week, what
23 that means in terms of your perspective as a biomechanical
24 engineer?

25 A. I think primarily the field of occupant kinematics just

1 deals with -- it's just a word to use for passenger motions,
2 if you will, how people move inside of -- inside of vehicles,
3 and that's all that really refers to.

4 In other words, if a mother stops very shortly at a
5 stop light or a dog runs in front of the car and a little
6 child is sitting on the seat next to the mother unrestrained,
7 the mother stops the car and the child continues, the
8 occupant kinematics or the passenger motion of that baby is
9 toward the front of the car. And that's what we're talking
10 about.

11 Q. And in this area of biomechanical engineering, what does
12 the term "injury causation" mean?

13 A. Injury causation relates to the interaction between the
14 individual and the environment. What is it in the
15 environment that produced the injury? What type of
16 interaction between that individual and either a vehicle or a
17 part of that vehicle or even the outside sometimes produced
18 the injury? What was the injury-causing item?

19 Q. And in looking at this whole question of how injuries
20 are produced in automobiles and otherwise, as you have, in
21 terms of the effectiveness of any particular safety device,
22 what does that term, "effectiveness" or "overall
23 effectiveness" mean in that context?

24 A. I think effectiveness can have many, many definitions.
25 But primarily we're looking at the ability of a safety

1 device, let's say, to either reduce injury or to prevent
2 fatality.

3 In other words, if you take a population of people
4 who do not use the device, how many would be killed, let's
5 say. And if we take a population who do use it, what is the
6 percentage of people who would be saved by using that
7 particular safety device?

8 Q. Now, in addition to this question of occupant kinematics
9 or occupant motion and also injury causation and
10 effectiveness, those issues, do you also have experience in
11 the general area of vehicle movement, reconstruction
12 kinematics and so forth?

13 A. Yes, sir, I've been involved in that area. I do not do
14 accident reconstruction primarily, but I have background and
15 training in accident reconstruction, and that is a large part
16 of the biomechanics or understanding how people move inside
17 of a vehicle.

18 Q. All right. Would you, before we get to this specific
19 case, just generally describe your company and the services
20 it provides and so forth, please?

21 A. Yes, sir. I work with an organization called [REDACTED]
22 Research Corporation in [REDACTED] It was founded
23 in [REDACTED] to basically understand the human body's reaction to
24 impact forces.

25 Today we have about 85 or 90 folks both in [REDACTED]

1 [REDACTED] and in [REDACTED], and we do work not only of
2 this nature, but we also do work, basic research with the Air
3 Force, the military, trying to understand some of the
4 problems that are involved in training of high speed pilots.

5 The next generation of aircraft, for example, will
6 require the human body to undergo loads and motions that
7 they've never been put through before. The pilots will need
8 to be trained in ways that we don't have the capability
9 anywhere in the world to train those pilots today, so the Air
10 Force has asked us to look at setting up the training
11 programs and profiles for the next generation of top gun
12 pilots, if you will.

13 We've also looked at means of protecting the neck
14 of pilots in high speed combat situations. The planes today
15 have such tremendous capability that virtually 100 percent of
16 all the combat pilots wind up with chronic neck strain
17 because of the tremendous loads that are put on their neck
18 during high speed maneuvers, so we do a wide variety of
19 things, sir.

20 Q. When you consult like this in litigation, you charge for
21 your services, of course?

22 A. Yes, sir, we do.

23 Q. But through your company, in addition to that type of
24 activity you just described, does it do a wide variety of
25 other things other than just consult in litigation?

1 A. Yes, sir. We're also involved in analysis of low speed
2 type accidents, what causes soft tissue type injuries in load
3 speed, not high speed like we have here today, but low speed
4 type injuries.

5 We deal with issues of causation that are not in
6 the suit but there's not in suit, but there's an issue as to
7 which of several impacts may have called soft tissue injury,
8 neck strain, low back pain, those things as well.

9 Q. If we could move to this case, to the [REDACTED] case,
10 and ask you if you were requested by me to investigate
11 certain aspects of this accident?

12 A. Yes, yes, we were.

13 Q. And specifically what were you asked to do, sir?

14 A. I was primarily asked to do the accident reconstruction
15 primarily as furnished by [REDACTED] to take a look at all
16 the factual information available through the police report,
17 EMS report, death certificate, the coroner's report,
18 the deposition testimony of the various people who have been
19 deposed and involved in the case, to inspect the vehicle
20 myself, and to try to make some determination regarding the
21 injuries and where they came about and what the injury
22 causation was, sir.

23 Q. Do you recall specifically which -- which witnesses or
24 depositions of which witnesses you relied on or you reviewed
25 and -- not relied on, but reviewed in connection with your

1 investigation?

2 A. I certainly reviewed the depositions of the family,
3 [REDACTED] [REDACTED]. I've also reviewed the depositions of the
4 coroner, [REDACTED], and both members of the [REDACTED] family
5 who were involved in the -- embalming type process and the
6 funeral process.

7 Q. And were those the [REDACTED] and [REDACTED] the prime --
8 your prime sources regarding the injury and so forth?

9 A. I think as regards the nature of the injury, per se,
10 those would have been the prime sources, yes, sir.

11 Q. And have you also had the benefit of photographs of the
12 vehicle and the scene and so forth?

13 A. Indeed, yes, sir.

14 Q. In terms of your own investigation, tell me what you did
15 by way of investigating the vehicle and the scene, the
16 vehicle, in particular, in this accident?

17 A. I think primarily I went to the -- went to the vehicle.
18 and was able to spend several hours inspecting the vehicle,
19 both from the outside to gain an appreciation for the type of
20 rollover, and the type of impact forces applied to the
21 vehicle as well as inspecting the vehicle from the inside to
22 try to gain some insight regarding what we talked about
23 earlier, the occupant kinematics.

24 Because oftentimes a vehicle will leave what are
25 called witness marks inside -- I'm sorry. An occupant will

1 leave what are called witness marks inside a vehicle and
2 these are simply areas inside the vehicle where we can see
3 deformations or bendings or what have you that are left by
4 the occupant that help tell us how that occupant was moving
5 inside the vehicle during the -- during the accident
6 sequence.

7 Q. We'll get to your opinions in more detail in a minute,
8 but I -- based on your investigation and your review of the
9 materials that you looked at and your inspection of the
10 vehicle and the records and so forth, would you give the jury
11 an overall view of your opinions with regard to the issues
12 you looked at in this matter?

13 A. Yes, sir. I think in general, my opinions fall into
14 several categories. I think, number one, it would be my
15 opinion that this is, indeed, a very -- very severe, very
16 high speed rollover type process, and that in itself involves
17 a tremendous potential for injury for any type of occupant,
18 unrestrained or restrained, with any type of device. I think
19 there's a tremendous potential for injury or death in that
20 type of process.

21 Number two, I think that the major injury, of
22 course, was the decapitation process. I think that number
23 three, that it would be my opinion that that occurred in the
24 area during the rollover process, in the area of
25 approximately two and a half to two and three-quarters rolls

1 after the vehicle had been rolling, and that it occurred as a
2 result of interaction between the neck and the sun roof of
3 the vehicle.

4 Q. You mentioned that you had reviewed
5 reconstruction. And what I would like to ask you, sir, is
6 what is the relationship of the accident reconstruction to
7 your area of investigation and to the opinions that you hold
8 with regard to the matter?

9 A. I think there's important interaction, interplay, that
10 works between the accident reconstruction by an accident
11 reconstructionist like [REDACTED] and by a biomechanic. And
12 maybe I can make that a little more clear and shorten it a
13 bit if I could just draw a diagram.

14 Q. All right.

15 [REDACTED]: Judge, can he come down?

16 THE COURT: Did we either get some new paper or --

17 [REDACTED]: I believe we've got a new pack here.

18 THE COURT: That's wonderful. I'm glad between all
19 of us we're able to come up with a clean sheet of paper.

20 [REDACTED]: We're missing a marker, still, but I
21 think we'll do with this one. Let me move this down. Let me
22 move this microphone over here so -- all right, sir. If --

23 [REDACTED]: Can I come up here?

24 THE COURT: Sure.

25 BY [REDACTED]

1 Q. If you would, explain by using the easel, the
2 relationship of the reconstruction aspects of the matter with
3 the work that you do, sir?

4 A. Okay. I think it's important to understand, the best
5 way to understand the interrelationship between the -- what
6 the accident reconstructionist does and what the injury
7 reconstructionist or the biomechanic does is to look at an
8 accident in terms of four component parts.

9 Every accident can be broken down into four
10 component parts. And what are those? Number one, -- number
11 one, we have the vehicle motions. Before anything takes
12 place, something has to happen with the vehicle. As long as
13 the vehicle is riding down the road in a straight line,
14 nobody is getting injured, everything is fine. So something
15 has to happen to the vehicle in order to set the whole
16 accident sequence into -- into effect.

17 Once the vehicle does something unusual, it's
18 impacted by another car, hits a pole, rolls over, then the
19 occupants begin to move. So once we have that, then we have
20 the occupant, we call the kinematics of the motions of the
21 occupant. Once the vehicle does something.

22 For example, we talked about the mother that slams
23 on the brakes and the child that goes forward. That's an
24 example of the occupant motions. Somebody gets hit from the
25 rear, they go backwards with respect to the car, that's the

1 occupant motion. So the vehicle has to do something first.

2 Now, as long as the occupant is in motion, there's
3 no problem. But eventually the occupant comes into contact
4 with something. And once there is contact, then we have the
5 potential to set up what we call the biomechanical force
6 approximates.

7 As long as there are no forces set up and the
8 occupant is moving, there's no problem. Once an occupant
9 impacts something, the biomechanical forces are set up. An
10 individual that falls out of a building does fine on the way
11 down. It's not until they hit the ground that they begin to
12 have a problem. That's when the biomechanical forces are set
13 up that if they exceed the ability of the human body to
14 withstand those forces, then injuries occur.

15 Now, we're subjected to biomechanical forces all
16 the time. If I press on my hand or shake hands with
17 somebody, there are biomechanical forces that are set up.
18 Those are below the limits of human tolerance. If we get
19 forces beyond the limits of human tolerance, more than the
20 body can stand, then we have injuries.

21 Now, this is basically the scenario for every
22 accident. These are the types of things that happen in every
23 accident. Now, what the accident reconstructionist does, the
24 first question the accident reconstructionist asks is where
25 is the vehicle? What kind of damage do I have to the

1 vehicle? How fast was the individual going? Is this a
2 rollover, side impact, interaction between a car and a train?
3 What am I dealing with?

4 So the accident reconstructionist starts with the
5 vehicle and works his or her way forward from the vehicle and
6 with an understanding of the vehicle can predict how the
7 occupant can move inside that vehicle. That's sort of a,
8 what we would call a prospective analysis, looking from the
9 very first thing that happened and working his or her way
10 forward, always keeping in mind that as a result of all of
11 this, there were forces that were set up and injuries that
12 were sustained. And that's what we call the accident
13 reconstruction.

14 The biomechanic, on the other hand, the first
15 question out of his or her mouth is usually as follows: What
16 are the injuries? What type of injuries were sustained in
17 this accident? That's the primary focus. So the biomechanic
18 starts back from the injuries, and given the injuries, say,
19 ah, knowing those injuries and knowing the human tolerance of
20 the body, we can predict that certain biomechanical forces
21 had to be set up and then try to analyze where in this
22 particular accident were those forces set up.

23 The biomechanic works backwards, starting from the
24 injury coming forward, always keeping in mind that this
25 vehicle had to do something beforehand. That's the injury

1 reconstruction or the biomechanical analysis.

2 The importance of this interplay is that the area
3 of overlap between the two is the field of occupant motions.
4 So when you have the accident reconstructionist coming from
5 the vehicle forward and the injury reconstructionist coming
6 from the injuries backwards, there is a meeting in between in
7 the area of the occupant motions or how the occupant moves
8 inside the vehicle. And it's when you get an agreement
9 between those two that you begin to feel comfortable with the
10 type of analysis that you come up with.

11 Q. In terms of this particular area, do you do your own
12 analysis of the accident reconstruction area?

13 A. I do my own analysis only to a certain extent, a broad
14 overview. As I indicated, I've had training in the field of
15 accident reconstruction. What I try to do is get an overall
16 picture and then work that in with the details from the
17 accident reconstructionist, and as long as what the accident
18 reconstructionist is saying doesn't seem unusual to me, then
19 I will generally defer to the accident reconstructionist for
20 the details of the speeds, the number of rolls and things of
21 that nature.

22 Q. And in this case, did you do that sort of analysis and
23 how did it -- how did it jive? How did it relate to what Mr.
24 [REDACTED] had done?

25 A. I think it was very consistent. Obviously from my

1 analysis of the vehicle when I did the vehicle inspection, it
2 was obvious to me this was a rollover, it was mostly a side
3 to-side type rollover, there were no big frontal impacts, no
4 big impacts to the rear of the vehicle.

5 The scratch pattern showed at least two rolls,
6 probably more, and [REDACTED] came up with about three and a
7 half rolls, and that's certainly consistent with the
8 distances involved and the speeds involved. So there was, I
9 think, a good correlation between what I saw as an overview
10 and what he came up with within a detailed analysis.

11 Q. Focussing now on reconstruction and the
12 point at which he believed that the vehicle started to roll,
13 what is your understanding as to what speeds we're talking
14 about?

15 A. It's my understanding that the -- what we call the trip
16 velocity, the speed of the vehicle right before the rollover
17 begins, was in the range of 56 to 62 miles an hour, sir.

18 Q. And in terms of looking at that, in terms of severity,
19 as a biomechanical engineer, how would you describe that
20 accident, in terms of its severity?

21 A. I would classify that as extremely severe. And the only
22 way that I can really put that into focus is in 20 years of
23 looking at accidents I've only been involved in one rollover
24 that had higher initial trip velocity.

25 Q. Let me ask you now to approach the right-hand side of

1 this equation or diagram, if you would, and starting with the
2 injuries that you understand occurred in this accident,
3 please describe those injuries for the jury.

4 A. Okay. I think basically there were only two injuries
5 described. Of course, there was a decapitation, a separation
6 of the head from the body at the level -- almost at the
7 shoulder level or right above the shoulder level and, of
8 course, that is, without question, the major injury.

9 The other injury that is significant, perhaps from
10 a biomechanical standpoint, is the fact that there was a
11 reported fracture of the left femur. The large bone in the
12 left leg also was reported fractured. And those were really
13 the major -- the only two major injuries, sir.

14 Q. In your area or field, can the absence of injury be
15 significant?

16 A. Yes, sir, they can.

17 Q. And was that important to you here in this matter, that
18 is, the absence of injury in other areas?

19 A. I think so. Those are what we would call -- in medicine
20 we would call those significant negatives, when a patient
21 presents with headaches oftentimes, let's say, we ask the
22 question, has it been going on for a long time? No. Is it
23 sudden onset, blinding type pain? No. If you had loss of
24 vision, no. Those are things that are negatives, but they
25 are significant in trying to determine whether or not this is

1 just a vascular headache like a lot of folks have or is this
2 perhaps an aneurysm inside the head that is expanding.

3 So we look at the negative sides, those are called
4 significant negatives from certain things that don't exist
5 can often times be as important as what does exist, in terms
6 of trying to arrive at a conclusion.

7 Q. Let me ask you your overall opinion and then we'll
8 investigate that. What is your opinion, sir, as to how
9 [REDACTED] suffered this injury as compared to others that you
10 know have been expressed here?

11 A. Well, I think, as I indicated, it would be my opinion
12 during the rollover process that the interaction between the
13 sun roof metal trim area and the neck of the occupant
14 resulted in a large shearing type force in that area and the
15 decapitation.

16 Q. And is that opinion based on what you -- her motion or
17 what you believe her motion to have been within the vehicle?

18 A. That is correct, sir.

19 Q. All right. And in reaching that determination, did you
20 rely on your inspection of the vehicle?

21 A. Yes, sir, I did.

22 Q. First of all, let me, if you would, before we get into
23 this specific inspection, tell the jury the kinds of things
24 that you are looking for when you go out and look at an
25 automobile that's been involved in an accident in order to

1 make the determination as to how injury was caused and how
2 the occupants moved within the vehicle?

3 A. Okay. I think looking at the diagram, if we work our
4 way back with this thing, going into the vehicle inspection,
5 knowing what the injuries are, having an idea of what types
6 of forces are required to produce those injuries, and then
7 when we look at the vehicle, we try to gain some insight as
8 to what were the occupant motions? How did the occupant move
9 inside?

10 So one of the things we're very interested in
11 looking at on the inside is are there any what we call
12 witness marks inside? Are there any indications or, let's
13 say, signatures of occupant loading left inside the vehicle
14 that tell us the occupant was going toward the front or
15 toward the back or toward the side? These are very important
16 decisions we have to make in trying to determine how an
17 individual moves inside of a vehicle.

18 And if there are witness marks left inside the
19 vehicle as a result of those motions, that helps us in
20 determining what the occupant did inside.

21 Q. When did you inspect the [REDACTED] vehicle?

22 A. I believe it was in [REDACTED] of 1991, sir.

23 Q. All right. Dr. [REDACTED], I have here Defendants'
24 Exhibits [REDACTED], [REDACTED] and [REDACTED] which are photographs taken of the
25 vehicle and that we've had blown up. And as I understand,

1 there's no objection.

2 [REDACTED]: No objection, Your Honor.

3 [REDACTED]: We would tender them at this time,
4 Your Honor.

5 THE COURT: They are admitted.

6 THE CLERK: What number are they?

7 [REDACTED]: [REDACTED] and [REDACTED]. If I could ask
8 you to come down again, [REDACTED] and I'll get this small
9 easel. May I?

10 THE COURT: Sure.

11 BY [REDACTED]:

12 Q. And if you would, pick out those photographs that you
13 think best reflect to the jury what you saw, what you found
14 significant during your accident -- I mean, your vehicle
15 inspection.

16 A. Okay. I think if we first take a look at Exhibit [REDACTED],
17 this is an exhibit taken standing on the trunk of the
18 vehicle, standing on the trunk and looking down into the top
19 of the vehicle. So what we see up here, we see the
20 windshield, this is the sun roof area, and, obviously,
21 looking into the passenger compartment. We have the steering
22 wheel, drivers seat, gearshift, and passenger seat, in that
23 order.

24 So we're looking in the vehicle standing up on the
25 deck lid looking down into the vehicle. And I think what is

1 significant when we look at the channel, this roof channel,
2 this metal molding, let's say -- not molding, actually, it's
3 what we call a pinch-weld flange. It's more of a flange, in
4 the area of the sun roof. What we see is that there's a
5 change in the contour of that flange in the area of the
6 driver's area.

7 We're going to show this in more detail. I wanted
8 to give an overview reference, but if one follows the line
9 here of this metal flange, one sees that there's a change in
10 the continuity of that flange. There's a deformation of that
11 flange from a more flattened out to pointing more vertically
12 and toward the left-hand side as if that had been loaded from
13 the inside toward the outside and from the passenger side
14 toward the driver's side of the vehicle.

15 That is better shown in Exhibit [REDACTED] which is now a
16 view taken from the top looking in now, we're looking right
17 in the area of the deformation. We're looking into the top
18 of the sun roof again, passenger seat here. You can see the
19 emergency brake handle in the center there and what we have
20 is this metal flange, this metal flange which is normally in
21 a horizontal position, as we can see here, has been deformed
22 and bent up and curved around. So that has been loaded in a
23 fashion to bring it up from the inside out.

24 We can see what we're seeing here on this lower
25 edge normally points toward the inside of the vehicle. And

1 so that is deformed up toward the outside as well as toward
2 the left-hand side. It's as if that metal flange, which is
3 sitting horizontal, has been bent in that fashion. We've
4 actually taken this metal here and deformed it up in that
5 fashion. And it also has a fairly rounded contour, as you
6 can see.

7 And it would be my opinion that this is the witness
8 mark that had been left by the interaction between the neck
9 and the pinch-weld flange in that area.

10 Q. And do you have any other witness marks or any other
11 features of your vehicle inspection that you think were
12 significant?

13 A. Yes, sir. Exhibit [REDACTED] is a view once again taken from
14 the top. And this is a confusing view and requires a little
15 orientation, but this is looking down into the top of the
16 vehicle. Here again, we see the opening for the sun roof, we
17 see the flange deformations here. This is the top of the
18 vehicle, the windshield, this is part of the door.

19 And what's significant here is that there is a
20 tremendous bowing, there is a tremendous outward bowing of
21 the driver's door. This is the driver's door that has been
22 bowed out as if a large load had been applied from the inside
23 toward the outside taking the entire door and bowing it
24 toward the outside.

25 So what we have is a pattern of movement or of

1 witness marks that are consistent with a pattern of movement
2 from the right-hand side of the vehicle, from the passenger
3 side toward the driver's side, which have produced two major
4 deformations, one to the sun roof flange and the other to the
5 door in bowing it outward.

6 Q. Where is that deformation on the door in terms of up and
7 down or top to bottom or so forth?

8 A. The door is actually not only bent out, it is also bent
9 in an open fashion, so most of the deformation is toward what
10 we call the belt line area, up high in the door where one
11 would rest one's arm if one were driving with the window
12 down, more upper than toward the lower part of the door, sir.

13 Q. And would that deformation in your judgment be made with
14 someone who was on the seat or in some other position?

15 A. No. I think because the deformation is mostly toward
16 the upper part of the door, it would be made by someone who's
17 not with the buttocks in the seat, but, rather, with the
18 buttocks raised up off of the seat at the time of that
19 impact.

20 Q. Are there any other features of your inspection, any
21 other witness marks that you recall that played some role in
22 the opinions you hold with regard to the matter?

23 A. The only other witness mark is the fact that the
24 driver's seat back, where the driver sits, that seat back was
25 deformed slightly toward the left-hand side as well.

1 Q. What is the significance of that?

2 A. You know, it could come about from the loading in the
3 vehicle. It could also represent some occupant contact as an
4 occupant is moving from the right-hand side to the left-hand
5 side.

6 Q. Dr. [REDACTED], you had the understanding or you certainly
7 were informed that the plaintiffs and their witnesses would
8 be taking the position that -- that this shoulder restraint
9 or upper torso restraint caused the injury, actually caused
10 the decapitation?

11 A. That's my understanding, yes, sir.

12 Q. And during the course of your investigation of this
13 matter, did you -- did you consider that as a possible cause
14 of injury?

15 A. Yes, sir, I did.

16 Q. I probably shouldn't have let you go back, but let me
17 get you to go back -- come back down, if I could, now, and
18 tell the jury, if you would, and also show what you would
19 expect to have seen, if that had occurred. In other words,
20 if the seatbelt had been actually what caused -- caused
21 [REDACTED] injury.

22 A. Okay. I think the main thing to keep in mind is that
23 for something like the seatbelt to cause the injury, there
24 has to be more than simple contact. Do you have a piece of
25 paper I may use for a second? Something like paper.

1 Everybody has probably had a paper cut, but how does that
2 come about? It doesn't come about by contacting the paper in
3 a right to left or left to right mode.

4 What happens when we run across thin objects that
5 maybe are under tension, cuts come about from a gliding type
6 motion. There has to be movement along the length of the
7 narrow edge. We don't get it by pushing in on the side. So,
8 therefore, one of the things that is required is that there
9 has to be somewhere evidence of what I would call a gliding
10 motion.

11 So that means that somewhere there has to be
12 evidence between the occupant and the restraint system or
13 whatever it is that produces not only force in from the side
14 but also produces movement in order for this to act in this
15 shearing or gliding type fashion.

16 There are four areas in an accident where one might
17 look for gliding motion or look for the mechanics that would
18 set up the potential for gliding motion. First of all, we
19 would look toward the accident reconstruction. From the
20 standpoint of the vehicle, do we have the types of motion
21 that would set up large movements between the occupant and
22 the restraint system to produce this gliding motion?

23 Do we have rapid spinning of the vehicle, spinning
24 about its axis, not a roll, but a rapid spinning, do we have
25 that? Do we have a very large impact from the rear that

1 would cause the occupant to move rearward with respect to the
2 restraint system or a large impact from the front that would
3 cause that? And we really do not. In the accident
4 reconstruction what we have is a lateral type roll. So we
5 don't really see that from the accident reconstruction.

6 Number two, we look at it from the standpoint of
7 the occupant kinematics. Looking inside the vehicle, in
8 order to get the occupant to move rapidly with respect to the
9 restraint system in a fore or aft motion because the
10 restraint system is coming across, what -- what types of
11 motions do we have evident in the vehicle? Where are our
12 witness marks? Is the seat back broken back? Do we have
13 deformation of the steering wheel, steering column? Is the
14 occupant slammed forward with great speed in the instrument
15 panel? We don't have any of those things.

16 What we do have is evidence of occupant motion from
17 side to side, putting more of a pressure type rather than a
18 gliding type fashion. So from an occupant kinematics
19 standpoint, we have the deformation in the sun roof, the
20 door, perhaps the seat back and the side, but we don't have
21 anything in the occupant movement that tells us about a
22 gliding type -- type of fashion.

23 Number three, we would look to the occupant. We
24 would look to the individual, the person with the injury.
25 What about the passenger -- let's say the driver, in this

1 case. If we have a gliding type of motion, then certainly
2 we'd expect to see one of the things that when we do know
3 there has been a problem with inter-action between the
4 occupant and the belt there are usually certainly abrasions
5 left because of the sliding type motion, abrasions left along
6 the skin and the area of contact with the belt.

7 Do we have any of that in this particular case?
8 Has there ever been anybody who has reported any abrasions
9 anywhere on the torso, the head, the neck, anything that
10 would indicate a sliding type motion? And we really do not.

11 And fourth, we go to the belt itself. Take a look
12 at the belt itself.

13 Q. Before you develop that area, Dr. [REDACTED] said something
14 about the belt being made out of nylon and it being as strong
15 as steel, and so forth. Do you know what the seatbelt is
16 made out of in this case?

17 A. Nylon has not been used in seatbelts for many years.
18 Many years ago we changed to a polyester type material so
19 nylon is not traditionally used in modern -- in modern
20 seatbelts.

21 All seatbelts have certain yield characteristics
22 that are dictated by federal law. They must have a certain
23 amount of yield. A seatbelt is designed, number one, to have
24 enough yield that it helps manage the energy and helps manage
25 the motion of the occupant.

1 On the other hand, it can't have so much, it can't
2 be like a rubber band that allows the occupant to go forward
3 into the steering wheel or the windshield or what have you.

4 So by federal law, there are certain
5 characteristics of every restraint system made in the world.
6 And those restraint systems are made out of polyester, not
7 nylon, and they do have stretch characteristics that are
8 governed to allow some motion, to absorb some energy of the
9 motion but not to allow the occupant to move so much that you
10 strike intercomponentry, so those are very well defined
11 characteristics.

12 [REDACTED]: Do you have the belt?

13 [REDACTED]: It's in evidence there.

14 BY [REDACTED]:

15 Q. Go ahead and, if you would, tell the jury what you would
16 have expected to see or would -- if, in fact, this gliding
17 motion had occurred and the belt had caused this injury?

18 A. Certainly, one of the things that you'd be looking for,
19 in addition to any evidence, perhaps, of blood or tissue or
20 what have you, which of course can be washed off, let's say,
21 but one of the things that we would look at from a mechanical
22 standpoint, let's say, from a mechanical structural
23 standpoint, one of the things we look at is there's a lot of
24 force involved in this. I mean, we have to go through tissue
25 and muscle and bone.

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1 And there's a lot of force involved in this in a
2 sliding type fashion. So one would look at the polyester
3 belt and expect to see at least some, what we call
4 architectural or structural disarray. I mean, there would be
5 some, what we call indicia on the belt, some evidence, some
6 forensic loading on the belt that would show some indication
7 of a loading pattern due to the interaction between the
8 tissues and bone of the occupant and the belt, and there
9 certainly was nothing, looking at it under a microscope --
10 I'm sorry, magnifying glass, there was nothing of that nature
11 that was evidenced. There was no structural --

12 Q. Give the jury an example of some kinds of things that
13 you might have expected to see.

14 A. For one thing, the belt has a very distinct weave
15 pattern to it. It's a series of woven type fibers and the
16 fibers oftentimes, under loading will fray, they will
17 disarray, you'll see stretch in those fibers. They will open
18 up. The fibers themselves will be abraded and pointing up,
19 the ends will be cut and pointing up sort of like a broom, a
20 broom at the end of them, they will be very frayed and
21 disarrayed. There was absolutely no indication of any
22 structural disarray anywhere on the belt.

23 Q. Were there any -- we have the belt here. Were there any
24 marks on the belt at all that you thought were significant in
25 terms of this particular incident?

1 A. Not that I recall. There's obviously some staining on
2 the belt which under the magnifying glass appeared to be mud,
3 and I think was verified to be mud. I believe there were a
4 few areas that might have indicated the belt had been loaded
5 slightly, but that there was nothing that indicated any
6 significant loading to the belt.

7 And certainly all the little fiber structure of the
8 entire belt was very well almost in its original condition.
9 So no indication of point loading, no indication of the kind
10 of things you might expect with a gliding fashion as
11 oftentimes reported in the literature in cases where there
12 has been interaction between the belt and an occupant that's
13 produced injury, sort of a shearing along the belt itself or
14 a shearing along the belt, nothing of that sort noted
15 anywhere.

16 Q. In addition to -- having expected to see some evidence
17 on the belt, what else would you have expected to see if this
18 seatbelt had actually been the cause of [REDACTED]'s injury?

19 A. As I indicated, there's also -- also the potential one
20 might expect to see tissue or blood or residue on the belt is
21 not like a knife or something metallic, the belt is a fiber
22 material and tends to absorb blood somewhat rather than just
23 wipe it off like a knife blade can, so often times one might
24 expect to see some residue of either tissue or blood on the
25 belt. That would be one thing.

1 Q. All right, sir. Continue with your list, if you would,
2 apart from the belt. What else would you have expected to
3 see, and what did you look for in connection with your
4 investigation as to whether or not the belt might have caused
5 this injury?

6 A. I think these are the major -- the major -- the four
7 major areas, looking at what one would expect to see, from
8 the vehicle motions, the occupant motions, the individual
9 herself, and the belt, itself.

10 Q. After investigating those aspects of the case, did you
11 draw any conclusions or reach any conclusions as to whether
12 or not the belt did cause this injury?

13 A. Yes, sir, I did.

14 Q. And what was that?

15 A. It was my opinion, based upon everything that I saw,
16 coupling together the accident, the type of accident, how the
17 occupant would be moving inside, the inspection of the belt,
18 analysis of the injuries, that the injury was not caused by
19 the belt, sir.

20 Q. While you're here, do you have just a little -- I hate
21 to call it a toy, but a little thing that would help you
22 explain to the jury what you believe did, in fact, occur?

23 A. Yes, sir, I believe -- yeah.

24 [REDACTED]: We will just use this just by way of
25 demonstration. It's not intended to be offered. Let me get

1 some of this stuff out of the way.

2 BY ~~REDACTED~~:

3 Q. Do you want an easel or do you --

4 A. No, I think -- if we take a look, and this is just a
5 schematic of a general vehicle, this doesn't have -- this is
6 not necessarily the reference vehicle, but what I have here
7 is an occupant that I can overlay in the vehicle as the
8 vehicle moves throughout its sequence.

9 And if we're looking at this from the back, assume
10 we're looking at the vehicle from the back, the driver is
11 going to be seated over on, of course, the left-hand or the
12 driver's side of the vehicle.

13 Now, recognizing the fact that the vehicle goes
14 through several roles, it would be my opinion that the injury
15 occurred when the vehicle has gone into the two and a half to
16 two and three-quarters rolls. So just assume with me now
17 we've gone one, two rolls and we're now at the end of the
18 second roll, and we're going into the two and one-quarter,
19 two and a half, and two and three-quarters roll position.

20 This is where we've essentially the only major
21 contact point in the vehicle. In the entire roll process we
22 have one huge impact to this vehicle. And it's after the
23 vehicle has rolled two and a half times before it has rolled
24 two and three-quarters times. So in that orientation is when
25 we have the tremendous deformation to the left side of the

1 fender, the A-pillar on the side, the roof rail, all of that
2 is deformed at that point in time.

3 That is the point in time where we have a potential
4 for a change in velocity between the vehicle and the
5 occupant, and that's what really causes injury. It's when
6 the vehicle does something different, it undergoes a change
7 in velocity relative to the occupant, that's when we have
8 injury.

9 As we talked about earlier, driving down the
10 highway at a hundred miles an hour with both the vehicle and
11 the occupant doing 100 miles an hour doesn't produce injury,
12 but running into a pole at 30 miles an hour produces injury
13 when that vehicle stops and the occupant keeps on moving, and
14 that's what happens here. The two --

15 Q. Before you get into that, let me -- just so the jury
16 will understand, explain what may -- what you think had been
17 going on inside the vehicle up until that point.

18 A. Basically, there was not a lot of movement. That's the
19 critical part in this accident, not a lot of movement of the
20 occupant prior to this particular point in time.

21 We know that as the vehicle leaves the road and as
22 it begins to turn sideways, that's like what? That's like a
23 sharp left-hand turn. And if someone -- if you're riding as
24 a passenger and the driver makes a sharp left-hand turn,
25 which way do you go? You go to the right. So basically

1 during that yaw process or that sharp left-hand turn, it
2 would be my opinion [REDACTED] would have gone somewhat toward
3 the center of the vehicle, gone toward the right.

4 During the first two rolls, the centrifugal forces
5 are going to tend to take her more toward the ceiling. We
6 don't have in the first two rolls, we don't have big impacts
7 to the left side to take her to the left, the right side to
8 take her to the right, the front to take her forward, or the
9 back to take her rearward.

10 So during those first two rolls the vehicle is
11 basically rolling laterally, and her movement early on is --
12 during the first two rolls is basically going to be to take
13 her toward the center and up. That's basically going to be
14 the movement because we don't have major interaction between
15 the vehicle and the ground prior to this point.

16 Q. At that point, in the second that -- at two and a half
17 rolls, what is your opinion as to what occurred?

18 A. When the vehicle comes from the two, two quarter, two
19 and a half, and now into the ground, let's say at this point
20 in time, and this is coming down, recognizing that this is
21 the -- if we draw a reference line, let's say, for a ground
22 line reference line, recognizing the fact that the vehicle
23 and the occupant are coming around from the two and a half
24 into this roll position and now it's just like dropping that
25 vehicle down.

1 As the vehicle stops, the occupant wants to continue in
2 the direction of motion, first law of motion, Newton's first
3 law, a body moving wants to continue moving until something
4 stops it. So it would be my opinion at this point in time,
5 because there is a partial ejection, there's partially out of
6 the sun roof at this point in time, as the vehicle stopped,
7 there are tremendous forces that are pressed against the
8 neck, which is into this area of the sun roof that we saw in
9 Exhibit [REDACTED] that at this point in time, the body wants to
10 continue to go out of the vehicle and toward the driver's
11 side, taking this metal channel and bending it up and out.

12 The head, of course, wants to continue to move, the
13 body wants to continue to move, and they do. And what
14 happens is that there is a transection at the area of the
15 neck. The body is off the seat. It then continues on and
16 produces the deformation into the door that we see on [REDACTED]

17 With that impact the neck produces the deformation
18 in the channel, and I believe that because the vehicle is
19 doing several things, the rotation wants to take her back,
20 the movement wants to take her that way, basically, the
21 decapitated head is more or less deposited. And we know that
22 there's no major injury to the head itself.

23 I think that's the kinematics that winds up
24 producing this, the inertial forces of the body and the head
25 to continue moving at this point of impact and the resisting

1 force of the roof channel that produces the injuries.

2 Q. I understand what you have said in terms of what would
3 have happened to her head. What would have happened to her
4 body during the remainder -- or after the decapitation
5 occurred?

6 A. I think what happens to the remainder of the body is
7 that at this point in time the body moves over and makes the
8 impression that we see in the door, as the vehicle continues,
9 recognizing now that the body is over to this side as the
10 vehicle continues now to three rolls, around three and a
11 quarter rolls at that point in time, because the door is
12 bowed open, I think that torso is ejected downstream and the
13 vehicle comes to rest at three and a half rolls and the torso
14 is downstream.

15 Q. And would her body have had to move back under the
16 restraint system?

17 A. Probably so, sir.

18 Q. All right, sir. Is there anything else again in either
19 of those photographs of the vehicle that -- that either
20 assist you or -- in any way in that sort of reconstruction of
21 the accident or the kinematics of the occupant and how she
22 got hurt, anything else in the photographs, the photograph?

23 A. No, sir.

24 Q. You mentioned the seat back. What was the significance
25 of that?

1 A. The significance of that is that the seat back was
2 deformed from the right-hand side to the left-hand side, and
3 that's consistent -- could be consistent with just the impact
4 forces on the vehicle, or could also be consistent with the
5 movement of the occupant at this point in time -- excuse me --
6 at this point in time as the body moves across toward the
7 door, it could also contact part of the seat and bring the
8 seat there.

9 Q. All right, sir. During the course of your investigation
10 or investigations of this sort in determining how injury
11 occurred, do you also, as a part of that investigation, look
12 at what might have occurred in terms of injury with -- with
13 the restraint system in a different posture or with -- with
14 the occupant unrestrained or with another type of restraint
15 system?

16 A. Yes, sir. I do look at the various alternatives for
17 alternate restraint systems, either unrestrained or alternate
18 restraint systems.

19 Q. And did you do that in this case?

20 A. Yes, sir, I did.

21 Q. All right. When you're going through that sort of
22 analysis, what is usually the first assumption that you make?

23 A. Usually what I'll do is assume the presence or absence
24 of a particular restraint system. In other words, we know
25 what type of restraint system was worn this date. And as a

1 first analysis I'll say, okay, let's see what would have
2 happened had there been no restraint system applied or what
3 would have happened had there been a three-point, a
4 conventional three-point system, or had the occupant in this
5 particular case applied the two-point available restraint
6 system, what would have -- how would things have changed
7 under those different sequences?

8 Q. In conducting that sort of analysis, are you familiar
9 with the work that General Motors has done in connection with
10 rollover type accidents?

11 A. Yes, sir, I'm familiar with the -- with the papers and
12 the presentations that were made in, I believe, '88 and '89,
13 sir.

14 Q. And have you reviewed the sequence of that testing which
15 involved an unrestrained occupant?

16 A. Yes, sir, I have.

17 Q. And are the principles that -- of engineering set out in
18 that particular film and test, would they be relevant to this
19 accident and the injury that might have occurred with an
20 unrestrained driver?

21 A. I think particularly regarding the injuries that would
22 have occurred with an unrestrained driver, I think they are
23 very relevant to indicate -- the types of motions are very
24 illustrative of the types of motions that an occupant goes
25 through during a rollover process.

1 Q. Before we get to that, first of all, do you have an
2 opinion as to what would have occurred with an occupant in
3 this accident who was not wearing any sort of restraint
4 system?

5 A. Yes, sir, I do. I think that in an accident of this
6 severity, given a trip speed of 65 -- I'm sorry --

7 [REDACTED] Your Honor, I'm going to object to the
8 relevance of an unrestrained occupant, doesn't have anything
9 to do with this case.

10 THE COURT: Overrule the objection.

11 [REDACTED]: Thank you.

12 BY [REDACTED]:

13 Q. Go ahead, sir. You may start over. The question was,
14 what is your opinion as to what would have occurred with an
15 unrestrained occupant?

16 A. Right. I think with an accident of this severity, a
17 trip speed of 56 to 62 miles an hour, three and a half
18 rolls, this is a tremendously serious accident. The
19 potential for serious injury is enormous. The types of
20 forces involved, kinematics, and such, an unrestrained
21 occupant inside this vehicle possibly being ejected or not
22 ejected, or even staying inside, has a tremendous potential
23 for sustaining extremely severe and probably fatal injury in
24 this accident in an unrestrained state.

25 Q. Is there anything in this particular test that would

1 demonstrate that opinion?

2 A. Very definitely, sir.

3 [REDACTED] Judge, we'd like to show the -- the
4 kinematics portion of the test that we showed the jury
5 earlier at this time.

6 [REDACTED] Your Honor, we have got the same
7 objection to that that we had when [REDACTED] tried to
8 introduce that same test, and it has to do with a -- can we
9 approach the bench?

10 THE COURT: Ladies and gentlemen of the jury, let
11 me ask you to retire to the jury room for a few moments,
12 please.

13 (Whereupon, the jury was excused from the courtroom, and
14 the following proceedings were held in their absence.)

15 THE COURT: First off, what is it you want to do?

16 [REDACTED]: Your Honor, we want to to show the
17 occupant portion of the test that we showed the jury earlier,
18 the exterior views, you recall, of the rollover test done by
19 General Motors, and we think it's pertinent for a number of
20 reasons.

21 First of all, it does illustrate his opinion as to
22 what might have occurred in this accident had she been
23 unrestrained. And as I understand the plaintiffs' theory of
24 this case, is this young woman did nothing to protect
25 herself, she did not wear the available restraint system, and

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1 they are, in effect, saying that because we put in an
2 automatic feature, that we have somehow enhanced her injury.

3 And I think this is very pertinent to the issue as
4 to the kind of injury she would have received had she -- had
5 we not even had this automatic belt system in here. And
6 since she did nothing to protect herself, this would be, I
7 think, pertinent to his opinion as to what would have
8 occurred had she been totally unrestrained, which would have
9 been the case had we not put -- had we not had an automatic
10 belt system.

11 ~~THE COURT~~: Your Honor, we've got the exact same
12 objection we had to this stuff before. The law required a
13 passive restraint system. We say they should have had a
14 passive lap belt. This is a totally unrestrained movement of
15 dummies in a rollover. You've allowed them to see the
16 exterior portion, and we think the interior portion would be
17 highly prejudicial, given the assumption that she would have
18 been wearing no restraint system at all, which is not the
19 case. She was wearing the passive restraint system provided,
20 and our contention is that she should have had a passive lap
21 belt.

22 THE COURT: Anything further?

23 ~~THE COURT~~: I think it's very relevant, Judge.
24 She did nothing, and this would have been the situation had
25 we not installed a -- the automatic belt system.

1 THE COURT: I sustain the objection. Bring in the
2 jury.

3 (Whereupon, the jury was brought into the courtroom, and
4 the following proceedings were held in their presence.)

5 BY [REDACTED]

6 Q. All right. Dr. [REDACTED], let me ask you to assume with
7 me or if you've done this, that there was a lap belt in place
8 or that there -- in this system or that there was a
9 three-point system that [REDACTED] had decided to use, and I
10 ask you first of all whether or not you have any opinion as
11 to whether in this accident she would have suffered this
12 injury, that is, the decapitation?

13 A. I think that had she been wearing the available
14 two-point lap belt in this accident, I think that she would
15 not have sustained the decapitation, sir.

16 Q. All right. Do you have any opinion as to the nature and
17 seriousness of injury that she might have sustained?

18 A. Yes, sir, I do.

19 Q. And what is that opinion, sir?

20 A. I think that she's at risk even with the lap belt on for
21 very serious head, possible neck injury, but certainly very
22 serious and possibly fatal head injury at the moment of the
23 two and three-quarters or two and a half to two and
24 three-quarters roll impact. May I just show the jury what I
25 mean by that?

1 Q. Yes. You may do it from there or you may come down.

2 A. We talked about the occupant rising up without the lap
3 belt. With the lap belt on, the occupant is going to tend to
4 stay more in the seated -- more in the seated position.

5 What happens there is that at the moment of impact
6 with the ground, the motion still wants to continue to take
7 the body and the head toward the driver's side. As this
8 vehicle comes around, the vehicle stops, what happens? The
9 occupant still wants to move toward the driver's side, and
10 what we oftentimes see is that with this, even with a belted
11 occupant, there's tremendous interaction between the head and
12 either the roof rail area or outside into the ground that
13 causes severe or fatal type head injuries and even neck
14 injuries can occur.

15 So based upon the severity of the accident, the
16 utilization of a two-point belt in addition to the available --
17 in addition to the shoulder belt, does not ensure lack of
18 injury because of the severity of the accident. And the
19 severity of this impact puts the occupant unrestrained or
20 restrained at a very high risk at that point in time.

21 Q. While you're using that, something I may have asked you
22 before, it's your opinion that [REDACTED]'s body passed back
23 under the seatbelt system before she -- it was ejected
24 outside the vehicle?

25 A. That is correct, yes, sir.

1 Q. And would it surprise you if that occurred, regarding
2 your opinion that there might be some blood or tissue on the
3 restraint system?

4 A. No. I think that certainly -- there's going to be
5 interaction, I think between the torso and the restraint
6 system, and there may well have been some transmitted, either
7 blood or tissue at that point in time.

8 Q. Do you have some schematics that would also demonstrate
9 to the jury the types of injuries that you believe she might
10 have incurred even with a lap belt of some kind, this lap
11 belt, or with a three-point system?

12 A. I think basically what I've shown here, I think the
13 potential for a severe or fatal head injury, sir.

14 Q. Let me show you what has been identified as [REDACTED] and --
15 [REDACTED] and -- is there any objection?

16 [REDACTED] No objection.

17 [REDACTED] All right. We tender those, Your
18 Honor.

19 THE COURT: They are admitted.

20 BY [REDACTED]

21 Q. All right. If you would come down, and using these,
22 just point out to the jury what injuries you might have
23 expected, even if she has on a lap belt. Use either one of
24 these you wish. Let me -- let me get you a microphone before
25 you get started. Sorry.

1 A. Okay. Okay. What we have in the belted position,
2 whether we're talking about a three-point belt or the
3 two-point shoulder belt and the available lap belt is we're
4 talking about a torso that is more restrained now. We talked
5 about how the torso rode up before it impacted into the door.

6 With the belt, the torso will still ride up, but
7 not to the same extent. But what happens if we imagine what
8 we also have is that we have out here a roof rail out here,
9 when you sit in the car, you've got the roof that curves over
10 toward the side, and we also have the door down this area
11 over here and the window in between, generally.

12 Now, at the -- if I may, at the two and
13 three-quarters position, at the impact position with the
14 belted occupant, the occupant still wants to move in this
15 direction. So what that does now, instead of bringing the
16 hips and torso into the door and producing injury up high, we
17 now have the potential for bringing the chest into the door,
18 the head into either the metal roof rail or or even into the
19 area outside. And because of the organs that we have in the
20 chest, we have a potential not only fore head or neck injury
21 at that point in time with this big impact from the ground,
22 we also have a potential for chest and abdominal type injury.

23 We have the spleen over here, the chest, the heart,
24 those things can be damaged with a tremendous blow and impact
25 into the door as we have at this point in time. So that.

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1 there are multiple potentials for injury at this point in the
2 accident restrained with a two-point belt as well as this
3 shoulder belt or a three-point restraint system.

4 Q. And is there a restraint system -- can you imagine a
5 restraint system that might have protected her in this
6 accident of this severity and this nature?

7 A. The only thing I can think of and I have seen -- I mean,
8 I have seen a restraint system of a type that would protect
9 in this particular accident, yes.

10 Q. And what is that, sir?

11 A. That is the one that is used by the Indianapolis type
12 races. It's a five-point harness with a crotch strap and a
13 helmet that protects movement during a crash. And I think
14 that type restraint system in an accident of this type would
15 have protected against these injuries.

16 Q. And do you believe that sort of restraint system should
17 have been used?

18 A. No, sir, I do not.

19 Q. And why is that?

20 A. I think the main thing is that when one looks at
21 restraint systems, there are multiple issues that have to be
22 considered. Number one is how effective is that restraint
23 system? What is its potential to reduce injury? If we just
24 look at effectiveness in the gross sense, the potential of a
25 restraint system to reduce injury.

1 And I might submit that the five-point with the
2 tethered helmet has more potential to reduce injury than
3 either the two-point, the two-point with the lap belt,
4 three-point or what have you.

5 But what is the value of that system? What is the
6 societal value or what is called in engineering terms the
7 benefit of that system? And there what you have to look at
8 is the potential to reduce injury times the utilization.
9 Will people utilize it? If I have a system that can prevent
10 against all injuries but nobody uses it, the value of benefit
11 of that system is zero.

12 So if we look at -- maybe we ought to write that on
13 the board because I think that's a very important concept to
14 understand in evaluating what -- what we should really look
15 at is what is the value of this system? What is this system
16 worth in terms of protection?

17 Q. Before you get to that, let me just ask you one other
18 question, would that system, that type system
19 have been legal?

20 A. No, sir.

21 Q. In the 1989 model year?

22 A. No, sir, it would not have been.

23 Q. And why is that?

24 A. Because it's not a passive system and there's no system
25 in the world that I'm aware of that's even been attempted to

1 make a passive system out of a five-point restraint system
2 with a tethered helmet, sir.

3 Q. I interrupted you. You were talking about this concept
4 of the value of the system.

5 A. When looking at how do you assess the value of the
6 system that's called, from an engineering standpoint, that's
7 called the benefit from an engineering standpoint, but I
8 think of it more in terms of what is its value? How good is
9 the system? What is the value of the system? Say what is
10 the value of the system. And that's equal to the
11 effectiveness times the usage rate, times the use of the
12 system.

13 So effectiveness, we can look at it as that's the
14 protection potential times the use rate. So it is a balance,
15 because what we're trying to do, what you want to do is make
16 this as large as possible. We want a system that will
17 protect the most people under the most sets of circumstances
18 throughout the world for all sized occupants, drivers,
19 passengers, what have you.

20 And so we must look at not only how effective is
21 the restraint system but how apt are people to use that?
22 Because if they don't use it, then it has no value, and
23 that's the most important concept.

24 Q. Have you made any judgments or do you have any
25 information as to the value of this system, as it is defined

1 by you?

2 A. There have been statistics that have been -- that have
3 been utilized that come up with benefits of two-point
4 motorized systems and three-point systems with and without --
5 with their usage rates and what have you.

6 And in order -- basically, in order for a
7 three-point system to have the same value as the motorized
8 system, motorized two-point system, we would have to have
9 about an 86 percent usage rate of the three-point system.

10 Now, we know today that today in the -- in the
11 country today we know that about 50 percent across the
12 nation, about 50 percent of the people use their three-point
13 manual belts. And if we look at that, that gives us about a
14 benefit -- a benefit of two-point motorized benefit, benefit,
15 is habit 32 percent, and if we look at the three-point manual
16 with 50 percent use, that's about 16 to 18 percent.

17 So if we look at the benefit, no matter how good
18 another system is, if the usage rate is less, then we have a
19 decrease in the overall benefit of that system. And that's
20 what we're trying to get. We're trying to get a system that
21 provides as much protection as possible for as many people as
22 possible and that will be used by as many people as possible.

23 Q. Dr. [REDACTED] have we covered the opinions that you hold
24 now with regard to this matter based on the investigation
25 that you have conducted?

1 A. I believe that's true, yes, sir.

2 Q. Let me just, in summary, would you tell this jury your
3 opinion again as to the severity of this accident, in terms
4 of the accident that you've investigated?

5 A. Yes, sir. I believe it's an extremely severe accident,
6 as I indicated, probably one of the worst rollovers that I
7 have seen in terms of the trip velocity and the potential for
8 injury.

9 Q. And from the standpoint of how [REDACTED] suffered her
10 injury, what is your opinion in that regard?

11 A. It's my opinion that the injury came about at the two
12 and a half to two and three-quarter roll position and that it
13 came about from interaction of the neck with the pinch-weld
14 flange on the sun roof, sir.

15 Q. And do you have any opinion that any restraint system
16 other than this five-point system that you have described
17 would have prevented her from having suffered any serious --
18 a serious injury or life-threatening injury in this accident?

19 A. There is no restraint system that I'm aware of in any
20 vehicle sold today that would prevent serious or fatal
21 accident in terms of this particular accident.

22 Q. And lastly, in terms of the your analysis of the value
23 of this system, what is your opinion in that regard?

24 A. I think this system has a tremendous value in society as
25 we know it today, sir.

1 THE COURT: Let's take about a ten-minute break.

2 (Whereupon, a brief recess was had.)

3 THE COURT: Bring in the jury.

4 (Whereupon, the jury was brought into the courtroom, and
5 the following proceedings were held in their presence.)

6 THE COURT: [REDACTED], you may proceed.

7 CROSS-EXAMINATION

8 BY [REDACTED]:

9 Q. Thank you, Your Honor. Dr. [REDACTED], do I understand
10 that you're the founder of [REDACTED] Research?

11 A. That is correct, yes, sir.

12 Q. Okay. And you're also the president and general --
13 chief executive officer?

14 A. I am, yes, sir.

15 Q. And have been from the inception of that company?

16 A. That is correct.

17 Q. And [REDACTED] who testified here last week, he's an
18 employee of yours; is that correct?

19 A. That is correct, yes, sir.

20 Q. And it was his accident reconstruction of this case that
21 you were relying on in the speed assumptions you made; is
22 that correct?

23 A. As for the details. The general concepts I agree with.
24 The speed details I deferred to him, that is correct.

25 Q. And do I understand that you're -- you've got a medical

1 degree and then you've got an internship in gynecology and
2 obstetrics; is that correct?

3 A. That is correct, yes, sir.

4 Q. Okay. And you now run a family practice?

5 A. That is correct, yes, sir.

6 Q. Now, you have recently lectured to last year, I believe,
7 the [REDACTED] Motor Company, Principles of Biomechanics and
8 Injury Causation; is that correct?

9 A. Yes, sir, I did.

10 Q. That was [REDACTED] of [REDACTED]?

11 A. I don't recall the date, but that sounds reasonable.

12 Q. And you gave a lecture to the [REDACTED] Motor Company on
13 Injury Causation in the Automotive Environment in [REDACTED] in
14 [REDACTED]; is that right?

15 A. I'll trust you for the dates. Yes, sir.

16 Q. And you gave two lectures to [REDACTED] Corporation
17 in [REDACTED] on Biomechanics and Injury Evaluation; is that
18 correct?

19 A. I didn't remember two, but that could well be.

20 Q. And some of your representative clients that you consult
21 for are [REDACTED] obviously.

22 A. Yes, sir.

23 Q. [REDACTED] do you consult for them?

24 A. Not directly for them, but for counsel for them, on
25 behalf of counsel, yes, sir, I do.

1 Q. Okay. And you've testified for [REDACTED]?

2 A. For counsel on behalf of [REDACTED] that is
3 correct, yes, sir.

4 Q. And you've testified for [REDACTED] company?

5 A. For counsel on behalf of them, yes, sir.

6 Q. And [REDACTED]?

7 A. Yes, sir.

8 Q. [REDACTED]

9 A. That is correct, yes, sir.

10 Q. [REDACTED]?

11 A. Yes, sir.

12 Q. [REDACTED]?

13 A. Yes, sir.

14 Q. [REDACTED]

15 A. Yes, sir.

16 Q. [REDACTED]

17 A. Yes, sir.

18 Q. [REDACTED]?

19 A. Correct.

20 Q. [REDACTED]?

21 A. Indeed.

22 Q. [REDACTED]?

23 A. Yes, sir.

24 Q. [REDACTED]?

25 A. Yes, sir.

1 Q. And am I correct that you've got [REDACTED] employees working
2 under you?

3 A. It's somewhere in that ballpark in the corporation, [REDACTED]
4 to [REDACTED] what we call full-time equivalents, yes, sir.

5 Q. And I believe your organization is divided into five
6 categories; is that right?

7 A. That is correct, yes, sir.

8 Q. Okay. And just tell the jury what those five areas of
9 your organization are?

10 A. Yes, sir. Basically, the five areas are we have five
11 separate areas of endeavor. One is what we call the injury
12 causation area, which is what I'm doing today. We have
13 people that work in, doing injury causation that is primarily
14 devoted to determining how injuries occur in accidents, and
15 most of these cases are in litigation or close to litigation,
16 but most of them are in litigation.

17 Q. You've got a consulting division, I believe; is that
18 right?

19 A. That's called the consulting division, yes, sir.

20 Q. Okay. And you've got an accident reconstruction
21 division?

22 A. That is correct, yes, sir.

23 Q. And you've got a biomechanical radiographic
24 interpretation division?

25 A. I didn't know it had all those names, but that sounds

1 right, yes, sir.

2 Q. What do you call it, the radiology division?

3 A. Radiology division, yes, sir.

4 Q. Okay. And then you've got an emerging support with
5 legal assistance, paralegal service, medical illustration
6 service; is that correct?

7 A. That is correct, yes.

8 Q. And these illustrations we've got, [REDACTED], that's your
9 corporation, prepared these illustrations?

10 A. It did, indeed, yes, sir.

11 Q. Now, I believe you told us that based on [REDACTED]
12 reconstruction, you calculated this particular rollover at a
13 trip speed of 56 to 62 miles per hour?

14 A. No, I don't believe that I calculated it. I believe
15 that was his calculation. That seems consistent, yes, sir.

16 Q. Okay. So you did not make an independent calculation?

17 A. Not of the trip speed, no, I did not.

18 Q. The trip speed that you're using is 56 through 62; is
19 that correct?

20 A. In that ballpark, yes, sir.

21 Q. Now, if I told you that [REDACTED] testified to this
22 jury that the trip speed was 46 to 56, that would material
23 change your opinions, wouldn't it?

24 A. It wouldn't change the major opinions, no. I mean, it
25 affects how the -- the severity of the accident still makes

1 it a very severe rollover. I had higher speed from him that
2 I was under the understanding of, but 46 to 52 still puts it
3 into the second worst rollover that I've ever been involved
4 in.

5 Q. Well, we've slowed it down ten miles an hour; isn't that
6 right?

7 A. Right. And I don't know whether he's talking about
8 going into the trip or coming out of it. There's a
9 difference between those two, and I don't know what figure
10 that refers to.

11 Q. Now, suppose at least three other witnesses have put
12 this trip at any where from the 30 to 40 miles an hour range.
13 That would show slow it down considerably, wouldn't it?

14 A. That would not only slow it down, that would make it
15 inconsistent with the distances involved.

16 Q. Are you telling us that you couldn't get three and a
17 half rolls on a 35-mile-an-hour trip?

18 A. No. I think you could get three and a half rolls, but
19 I'm saying the tremendous distance involved would be a little
20 bit inconsistent with that.

21 Q. And that's your opinion as a reconstructionist?

22 A. That's my opinion based upon work in the field for 30
23 years.

24 Q. Okay. And that's not [REDACTED] opinion or anybody
25 else's opinion?

1 A. I think it's [REDACTED] opinion as reflected by his
2 trip speed.

3 Q. Okay. Now, you indicated that the literature in the
4 field describing decapitations described a shearing action;
5 is that right?

6 A. Or at least some relative motion. In other words, it
7 has to be -- obviously, there has to be a shearing type
8 action in order to have this type of injury. That, I think,
9 goes without saying.

10 Q. And what literature are you familiar with that describes
11 decapitations with belt systems?

12 A. There is some of the old literature. There is nothing
13 that I'm aware of with modern belt systems that describes
14 decapitation, but some of the older belt systems back in the
15 '60's where the geometry was totally different, there were
16 some reported cases of decapitations.

17 Q. And I believe you indicated you had read depositions of
18 the coroner, the family, and both [REDACTED] and [REDACTED] is
19 that correct?

20 A. That is correct, yes, sir.

21 Q. And part of your opinion was that none of these
22 witnesses gave you any indication of the injury you would
23 expect to see in a shearing type injury; is that correct?

24 A. No, I don't think I said, necessarily, a shearing type
25 injury. The injury itself is a shearing type injury

1 regardless of what the mechanism is. What I was talking
2 about is the gliding type of motion that we see with this
3 motion along the axis of the belt, sir. Certainly, the
4 injury itself is a shearing injury.

5 Q. Okay. Now, you specifically recall, I believe you told
6 this jury, reading the deposition of [REDACTED] is
7 that right?

8 A. That is correct, yes, sir.

9 Q. And he was the embalmer that actually embalmed this
10 body?

11 A. The son of the director, yes, sir.

12 Q. And do you recall in his deposition where he discussed
13 what looked like rope burns on her neck, do you recall that
14 testimony?

15 A. Rope burns on the neck?

16 Q. Yes, what looked like a rope burn on the neck. Do you
17 recall reading that in his deposition?

18 A. I don't recall offhand.

19 [REDACTED] Your Honor, I believe the witness
20 withdrew that. If he's going to tender that deposition he
21 needs to tender -- he needs to tender the entirety of it and
22 not take it out of context.

23 [REDACTED] I assume he can do that, Judge, if he
24 wants to.

25 BY [REDACTED]

1 Q. -- Dr. [REDACTED], I believe you indicated that during
2 this rollover sequence, this lady had to move back under the
3 belt, as the way the flesh got on the belt?

4 A. I'm not saying that's the way it got on the belt. All
5 I'm saying is during that interaction of the exiting of the
6 torso, that's a potential for it.

7 Q. Okay. And you would agree with me that during the
8 rollover and at the time of the decapitation in your opinion,
9 the shoulder restraint was somewhere around her legs; is that
10 correct?

11 A. That is correct. Well, legs -- I believe I told you
12 hips, legs, thigh, somewhere in that area, yes, sir.

13 Q. Lower torso?

14 A. Correct, yes, sir.

15 Q. Okay. And so obviously the shoulder restraint was no
16 longer acting as a shoulder restraint; is that correct?

17 A. It would not have been applied across the shoulder at
18 that point in time, that's correct. It would have been
19 against the torso or the hips or the thighs.

20 Q. Okay. And then what you believe is as she continued to
21 rollover, she went back under that belt and slid out through
22 the door?

23 A. That would be -- that in essence is my opinion, yes,
24 sir.

25 Q. I believe you had indicated in your deposition that you

1 believe she was partially out of this belt from the very
2 first roll, as she was beginning to gravitate toward the
3 roof, she was sliding out from under this belt until it was
4 down around her lower torso; is that correct?

5 A. Until it was down around the lower torso at the moment
6 of the decapitation, at the moment of the injury, yes, sir.

7 Q. And so your opinion is that the only time she slipped
8 back completely under the belt would have been after the
9 decapitation?

10 A. That's the only time in the accident sequence that
11 forces would have taken her in that direction, that is
12 correct.

13 Q. And you would agree that had she had a properly in place
14 lap restraint that this decapitation would not have occurred,
15 would it?

16 A. If she had worn the available two-point restraint
17 system, the decapitation would not have occurred, yes, sir.

18 Q. If she had worn any two-point restraint -- three-point
19 restraint system that had a lap belt with it this
20 decapitation would not have occurred, would it, properly
21 fitted?

22 A. Properly fitted, a lap restraint of any type, the
23 decapitation per se would not have occurred, yes, sir.

24 Q. And what you're trying to tell this jury here today is
25 that despite that, you think she would have been killed

1 anyway?

2 A. I think what I said in spite of that, because of the
3 nature of the impact at the two and a half to two and three-
4 quarter roll position that there was a tremendous potential
5 for either serious or fatal head injury or neck injury.

6 Q. Okay. Now, you're aware of the papers that discuss the
7 fact in rollover sequences the most serious injury is not
8 from the roof striking the occupant but the occupant
9 unrestrained striking some portion of the vehicle; correct?

10 A. I mean, that is -- an injury mechanism. That's
11 certainly not the only thing that happens, but that is one
12 described mechanism, yes, sir.

13 Q. And ejection is the other most serious risk; right?

14 A. I'm not sure I'd say the most serious risk. Most
15 injuries occur inside in a rollover but ejection is a risk in
16 a rollover.

17 Q. Okay. Would you agree that the risk of ejection is four
18 times greater with someone without a pelvic restraint than
19 someone with a pelvic restraint?

20 A. You know, the field data doesn't really support that.
21 The field data shows that the fatality rates have not
22 differed one or the other, but I don't know about anything
23 that says four to one ratio, anything of that nature.

24 Q. Okay. I want to show you Defendants' Exhibit [REDACTED], a
25 comparison of rates of fatal ejection from manual and

1 automatic belt cars. Are you familiar with that?

2 A. I don't believe so. I mean, I may have seen it at some
3 time. It's not --

4 Q. Okay. And when you're talking about your effectiveness
5 and usage rate, I believe basically what you're doing is
6 multiplying how much a person uses a belt times how effective
7 it is in protecting you from injury in coming up with this
8 factor of 32 percent or 16 percent or 18 percent you call
9 benefit; is that correct?

10 A. That, in essence, is how it's derived. It's a factor of
11 the effectiveness and the utilization as well. Both things
12 must be considered.

13 Q. And your statement is, if you don't use it, it has no
14 value; right?

15 A. I think that's correct, yes, sir.

16 Q. Okay. And you're aware of the studies that show that
17 approximately anywhere from 50 percent up as high as 85
18 percent of people with two-point passive belts and manual lap
19 belts do not use their manual lap belt, aren't you?

20 A. Those figures vary from time to time, but somewhere
21 around 50 percent, 25 to 50 percent is correct.

22 Q. And some are as high as 75 percent, aren't they?

23 A. There may be. I don't recall personally seeing anything
24 that high but --

25 Q. I'm going to show you Defendants' Exhibit [REDACTED] which is

1 in evidence. Are you familiar with that document?

2 A. Here again, I may have seen it at some time but I'm not
3 intimately familiar with it.

4 Q. Would you turn over to page 2 of that document or the
5 second page of that document?

6 A. Okay.

7 Q. And would you go down to the bottom of the first full
8 paragraph, and would you read the last sentence there?

9 A. "The authors found" -- is that where we are?

10 Q. Yes.

11 A. "The authors found lap belt use with automatic shoulder
12 belts to be lower than manual three-point belts in the same
13 model cars but were not able to reliably estimate how much
14 lower."

15 Q. This is describing a survey that actually found that
16 people with automatic shoulder belts used their lap belt less
17 than the person that has a manual three-point system, didn't
18 it? Isn't that what that says?

19 A. Yes. The lap belt usage was less than that not the
20 restraint system but the lap belt portion usage.

21 Q. Do you disagree with that?

22 A. I don't have a basis to agree or disagree with this.

23 Q. And you stand by the fact that if something is not used,
24 it has no value; is that correct?

25 A. I think if the entire restraint system is not used, that

1 is correct. That's not to say if a portion of it is not
2 used. What I'm saying, if the restraint portion, whatever
3 portion of it is used has to be evaluated independently as to
4 what the value of that portion is.

5 Q. And you're familiar with those studies from the '60's
6 that described two-point systems or shoulder harnesses that
7 were decapitating People, aren't you?

8 A. With the bandaleer type restraint systems usually
9 associated with door openings to give large dynamic loads,
10 that is correct.

11 Q. Now, Dr. [REDACTED], am I correct that you have not
12 performed a single autopsy yourself?

13 A. I don't think that I have been lead on it. I've been in
14 attendance at autopsies and that sort of thing, but I am not
15 a pathologist, no, sir.

16 Q. Okay. What is a forensic pathologist?

17 A. A forensic pathologist is usually an individual who's
18 trained in the field of autopsies, we call them anatomical
19 pathologists, as well, and try to determine cause of death
20 from the autopsy itself.

21 Q. And you are not a forensic pathologist, are you?

22 A. That is correct, no, sir.

23 Q. And while Dr. [REDACTED] said he had performed well over
24 10,000 autopsies, I believe you told us in your deposition
25 you had observed between six and ten autopsies; is that

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1 correct?

2 A. Probably participated in that number, yes, sir.

3 Q. Did any of those involve decapitations?

4 A. Not that I recall, no, sir.

5 Q. Okay. And did you request to see Dr. [REDACTED]'s
6 photographs of the [REDACTED] case which was another decapitation
7 case?

8 A. I have not seen those, no, sir.

9 Q. Okay. Did you ever request to see those?

10 A. No, sir.

11 Q. And have you personally been involved in any other cases
12 that involved decapitation?

13 A. No, sir, I don't believe so.

14 Q. And do I understand your testimony that the way you say
15 this accident happened is, for example, if I take my thumb to
16 act as the head and my index finger to act as the torso and
17 my other hand to act as the sun roof, that this was a
18 shearing action, that the body came down on top of the sun
19 roof in such a manner?

20 A. In essence, that is correct, yes, sir.

21 Q. Okay. And you say that -- said that in your deposition.
22 You basically told the jury that here today; is that right?

23 A. That is correct. That is my opinion, yes, sir.

24 Q. Now, do you have an opinion as to whether or not this
25 bowing that you described to the jury in Defendants' Exhibit

1 [REDACTED] occurred before or after the decapitation?

2 A. No, that particular bowing, I'd defer to [REDACTED] as
3 to when any particular part of the car deformed.

4 Q. Okay. But in your rollover sequence it never once comes
5 back on this portion right here after the decapitation, does
6 it? We can get your --

7 A. Well, I mean, I -- comes back onto that portion?

8 Q. Yes.

9 A. There's certainly been two rolls and the potential for
10 contact there before, before this, and then it goes over into
11 another complete roll.

12 Q. Okay. And we're at two and three-quarters right here?

13 A. Correct.

14 Q. And you've got her, basically, contacting -- trying to
15 get it to stick -- the sun roof when it comes down at two and
16 three-quarters?

17 A. Correct.

18 Q. This is a passenger reading roll, so it continues going
19 this way?

20 A. That is correct, yes, sir.

21 Q. And comes to rest like that?

22 A. Essentially like that. We don't know, it may roll a
23 little bit Beyond that point and comes back. We don't know
24 exactly what happened, but it comes back to rest in the three
25 and a half position roll.

1 Q. No reason to believe that the most violent contact would
2 have been on the end of the roll, is there?

3 A. No, sir.

4 Q. And you know, as an engineer, that that's highly
5 unlikely that the most violent contact would have been at the
6 end?

7 A. We certainly see cases where that is the case, but that
8 is not the case in this particular accident, that is true.

9 Q. And so the probabilities are that this deformation was
10 made either before or at the time of her head being severed?

11 A. Somewhere in that time frame, I would imagine, although
12 I'd really defer to [REDACTED] as to whether or not there
13 was contact in that area before. That is certainly the area
14 of the most significant impact.

15 Q. And your testimony is that this sheared through her
16 neck, cutting her head off?

17 A. That is correct, yes, sir.

18 Q. Now, Doctor, would you agree with me that if I take an
19 action or a knife blade and I weld a piece of metal right
20 blow the blade, that once I come in contact with the part
21 that's sticking out that I would expect that part to cause
22 damage to the neck or the head, if I'm, for example, making
23 the same type of cut with an ax, that once this metal portion
24 comes in contact with the flesh, I would expect to see injury
25 caused by that at the forces you've described in this

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1 rollover?

2 A. One might expect to see that.

3 Q. And there was no such evidence in this case, was there?

4 A. On what, now, on the --

5 Q. On either the neck or the torso?

6 A. Well, I'm sorry. Ask the question again.

7 Q. There was no such evidence on the -- from the
8 depositions and the testimony you've seen, there was no such
9 evidence of that type of trauma to the neck of [REDACTED],
10 was there?

11 A. Well, there was a severance, yes, sir. I mean, there
12 was severance of tissue.

13 Q. But there was no testimony as to any bruising or
14 anything else that would be associated with another metal
15 object coming in contact with the neck, was there?

16 A. Not more than one metal object. Certainly the object, I
17 think, that caused the injury is thin, and we might not
18 expect to see bruising from that because it is so thin, sir.

19 Q. And, in fact, the testimony is that this was such a
20 clean cut that there was no other injury to the head and at
21 the funeral they did not even require touching up; is that
22 correct?

23 A. That is my understanding, yes, sir.

24 [REDACTED]: That's all I've got, Judge.

25 THE COURT: Anything further, [REDACTED]?

REDIRECT EXAMINATION

BY [REDACTED]:

Q. [REDACTED] asked you some questions about how this injury occurred, and in terms of maybe her head and her torso may have been ejected. Was the location described by the witnesses for her head and her torso significant to you in determining how you made -- how she was hurt?

A. Yes, sir. That -- as a matter of fact, the -- what we call the final points of rest, let's say the positions of the head -- the head, the vehicle, and the torso are important, I think, in understanding the mechanism of injury -- not the mechanism of injury, but let's say the causation of injury.

Q. And would you explain that, please?

A. Sure. I think that, if I may have the little model there for a second, please, sir. I think one of the things that needs to be accounted for is the fact that there are really no indications of trauma to the head, per se, as [REDACTED] asked me. That is certainly true, there is no indication of injury to the head.

Now, what that means, in essence, we know that this is the major impact, and the head is found, basically, in that area, and the question comes up, how can that be if the vehicle is still moving downstream, the vehicle is still moving, let's say, from left to right? How is it that a portion of the body stays at the point of impact?

1 The way that happens is because the vehicle can be
2 viewed like a rolling tire, even though a tire may be going
3 60 miles an hour -- let's say a tire going 30 miles an hour,
4 at a point of contact it's going zero miles an hour, but the
5 top part may be going 60 but the center is going 30. So
6 what's happening here is at the moment of the injury there's
7 a velocity that wants to go toward the right but the
8 rotational energy is taking back to the left.

9 So what happens at the moment of the injury, the
10 head is essentially deposited in that particular area. Had
11 the injury occurred inside the vehicle, then there's no way
12 for the head to get outside the vehicle at this point in
13 time. It would be more likely that the head and body would
14 have been deposited in the same area at the same time.

15 So what is consistent here is that there is a
16 decapitation, the head is deposited, as the vehicle continues
17 to roll then there's the ejection only of the torso at about
18 the two quarter roll position downstream and the vehicle
19 comes to rest.

20 So what we have is the order, is the head, the
21 vehicle, and the torso. And I think that's very important to
22 understanding how these component parts get where they are.

23 Q. The other -- you were asked about the articles from the
24 '60's and so forth. And what you called a bandaleer system.
25 I can't --

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1 A. What I consider to be sort of a bandaleer type, it was
2 referred to at that time as a bandaleer system, it's much
3 different from any of the two-point systems today in that
4 it's a system that did not have anything else in the
5 containment system along with it, basically going from the
6 roof to the floor as opposed to going to the seat or some
7 other areas. They were different systems.

8 Q. And from an injury causation area, in reviewing those
9 articles, are those systems injuries different in terms of
10 how they were caused?

11 A. I think certainly, I think in those injures we did see
12 evidence of the abrasions and the gliding and the motions we
13 talked about. There's not evidence here.

14 Q. You also asked about, I believe, what's I think
15 described as the UMTRI study about usage rates. Have you
16 reviewed that article?

17 A. I think I may have reviewed it one time but I don't know
18 it in detail.

19 Q. My question to you real really is this: In connection
20 with your benefit analysis, you ended up with a 32 percent
21 benefit, but specifically with regard to the shoulder belt
22 part of this system, do you know what the usage rates of that
23 aspect of the system are?

24 A. Of the shoulder belt itself, the passive restraint
25 system there have been a lot of studies to look at this. But

1 basically we're talking in the range of 96 to 98 percent
2 usage of the shoulder belt, sir. It's a very high
3 utilization rate.

4 Q. And that, then, combined with the other as specs of the
5 system, produce this benefit which is twice as much as the
6 three-point system?

7 A. Right. And that benefit rate, I think it's important to
8 know that that benefit rate factors in the use and non-use of
9 the lap belt. That accounts for the overall system as seen
10 in society, accounting for both people who use the lap belt
11 and those who do not, as well, so it's not just the two-point
12 with the belt system.

13 [REDACTED] I believe that's all I have, Judge.

14 RECROSS-EXAMINATION

15 BY [REDACTED]:

16 Q. Dr. [REDACTED] what you're saying is that there's a 98
17 percent usage rate of the passive portion of the seatbelt
18 system in the Nissan case?

19 A. 96 to 98, depending upon whose figures you see,
20 something in that range, yes, sir.

21 Q. And we agree that in excess of 50 percent of those
22 people are not wearing their manual lap belt?

23 A. Somewhere in that range, yes, sir. I mean, I don't have
24 the exact statistics, but that is not -- that sounds about
25 right.

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1 Q. So approximately 50 percent of the people are driving
2 down the road in a hazard; isn't that correct?

3 A. No, that's -- not all -- not the system at all. As a
4 matter of fact, that system by itself, that system in and of
5 itself, if you look at the benefit of the two-point system
6 without the lap belt, take it out, you still come out to 29
7 percent. That's the benefit of the two-point belt without.
8 That is still a very fine restraint system, and I think
9 that's an important point to keep in mind.

10 Q. Are you familiar with Dr. [REDACTED]'s work on the [REDACTED]
11 system?

12 A. I think I've seen it at one time.

13 Q. Okay. And the [REDACTED] system is basically what we're
14 talking about here in the Nissan case, isn't it?

15 A. There may be some -- some fine differences. [REDACTED] for
16 awhile had a release on the center and sometimes they had a
17 non-detachable belt. There were some slight differences. I
18 mean, I don't want to compare them exactly, but it's a
19 similar concept, but hardware wise may be somewhat different.

20 Q. Do you disagree with Dr. [REDACTED]'s proposition on page 99?
21 And I've got it marked in red there, if you will read that
22 and tell me whether you agree or disagree with that.

23 A. Okay. "It is quite possible that at least one of the
24 fatalities, i.e., the neck fracture slash side glass ejection
25 case would have been prevented had the manual lap belt been

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1 worn in association with the automatic shoulder belt."

2 Q. Do you disagree or agree with that?

3 A. I mean, I don't have any basis. I have not evaluated
4 the case. I don't have any basis to either agree or disagree
5 with that, sir.

6 Q. Okay. But you do agree that [REDACTED] would not have
7 been decapitated had she worn a lap belt?

8 A. That is correct, yes, sir.

9 [REDACTED] Okay. Thank you.

10 FURTHER REDIRECT EXAMINATION

11 BY [REDACTED]

12 Q. One last question. Read the first two sentences of that
13 paragraph that [REDACTED] didn't ask you to read, if you would.

14 A. I don't -- this --

15 Q. It's down at the bottom of the page. In other words, he
16 asked you to read that sentence, he asked you to read this
17 sentence that it is quite possible. All I want you to do is
18 read the first two sentences of the same paragraph.

19 A. Okay. "From the foregoing cases it is obvious that the
20 automatic shoulder belts and knee bolster are offering
21 reasonable protection to front seat occupants of the Toyota
22 Cressida and that an even better protection system due to
23 higher usage rates. It is interesting to note that this
24 protection is afforded even though many of the individuals
25 did not wear the manual lap belt."

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1 Q. Is that your opinion?

2 A. That's consistent with what I've been saying, yes.

3 [REDACTED]: Nothing further, Judge.

4 [REDACTED]: Nothing further, Your Honor.

5 THE COURT: You may step down.

6 [REDACTED]: Judge, we have tendered some
7 additional exhibits and we also have the motions that we
8 filed this morning.

9 THE COURT: All right. The motions you filed this
10 morning are denied.

11 [REDACTED]: Judge, we then at this time tender
12 Exhibits [REDACTED] which is --

13 THE COURT: You don't need to identify -- just
14 tender by exhibit number.

15 [REDACTED]: All right. Any objection?

16 [REDACTED]: I don't think there's an objection to
17 that, Judge.

18 [REDACTED]: All right. [REDACTED] Is that admitted?

19 THE COURT: Just tender what all you want to tender
20 and then we'll worry about it.

21 [REDACTED]: All right, sir. [REDACTED], [REDACTED], and
22 [REDACTED]. Just one moment, Your Honor. I think we're almost
23 done. [REDACTED], [REDACTED], [REDACTED] and [REDACTED]. I believe that's all,
24 Your Honor.

25 THE COURT: Any objections?

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